finish
April · 1932
METAL PRODUCTS MANUFACTURING
FROM RAW METAL TO FINISHED PRODUCT

Pittsburgh Has a "New Look"

BILL WENNING

FRANK KOHNE

BURGESS HURD

GATEWAY CENTER. ARCHITECTS: IRWIN CLAVAN; EGGERS & HIGGINS.

Give Your Product a New Look with "Ceramic" Colors

Pittsburgh's program of progress is proving an inspiration to other American cities across the continent. The A.C.S. Convention may well prove an inspiration to you . . . to give your product a lift that will make it stand out . . . and bring repeat orders.

Colors get the business . . . and colors have always been our business. Meet us in the William Penn, and bring your color problems along. Bill Wenning, Frank Kohne, and Burgess Hurd will be on hand to greet you and to help you.

We will look for you
in our
William Penn quarters.
Remember the dates:
April 27 — May 1

CERAMIC COLOR & CHEMICAL MFG. CO.
New Brighton, Pa., U.S.A.

Sell the finish that can take heat

A Porcelain Enameled finish offers so many unusual sales features that one of its big advantages is often overlooked:

IT RESISTS HEAT DISCOLORATION. Heat does not mar the surface in any way.

Since Porcelain Enamel is processed at 1550 F., it will withstand any temperature it is likely to encounter in home service. Forgotten cigarettes or even hot electric irons don't harm its hard, glossy surface.

EASY TO CLEAN. Stains and dirt are easy to wipe off. There are no tiny surface pores to collect dirt and moisture.

LIFETIME FINISH. Porcelain Enamel is made of hard, rock-like minerals. Its handsome surface is not affected by time or rust.

RESISTS ACIDS. Acid-resisting Porcelain Enamel is not damaged by fruit juices, alcohol or commonly used chemicals.

RETAINS COLORS. Porcelain Enameled products can be supplied in any color and in any variations of shades. Colors never "fade"—even after years of use.

Uniform Qualities

Of course, the metal beneath the Porcelain Enameled surface must have excellent bonding qualities, flatness, and uniform fabricating characteristics. That is why more manufacturers have used more Armco Enameling Iron over a longer period than any other enameling base. That is why too it has become known as the "World's Standard Enameling Iron."

◀ *Stains caused by burning cigarettes are easily removed. Soap and water do the job.*

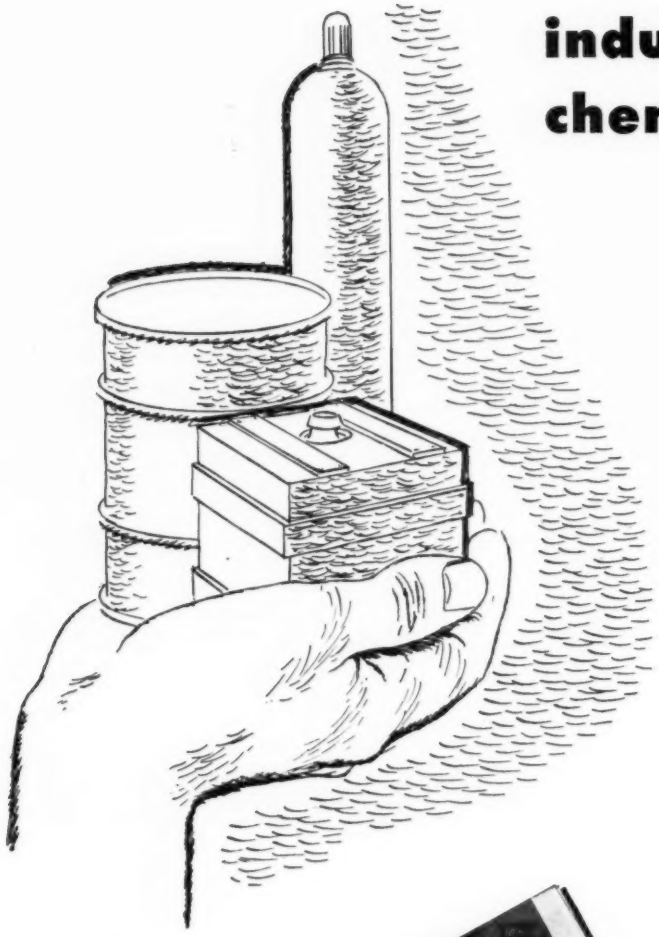
Armco Steel Corporation

ARMCO

2622 Curtis St., Middletown, Ohio • Plants and sales offices from coast to coast • Export: The Armco International Corporation

make your selection from these HARSHAW

industrial chemicals



- Electroplating Salts, Anodes and Processes
- Driers and Metal Soaps
- Ceramic Opacifiers and Colors
- Fluorides
- Preformed Catalysts, Catalytic Chemicals
- Glycerine
- Synthetic Optical Crystals
- Agricultural Chemicals
- Fungicides
- Chemical Commodities

Send for
this 32-page book—lists all the chemicals available thru The Harshaw Chemical Co.

THE HARSHAW CHEMICAL CO.
1949 EAST 97th ST. CLEVELAND 6, OHIO
BRANCHES IN PRINCIPAL CITIES

contents in front

WOULD YOU BELIEVE IT? *THIS* SHOT IS ANNEALED PRACTICALLY *One Pellet at a Time!*

Permabrasive annealed shot and grit is NOT annealed in batches—but is heat treated in unique fashion by a continuous process—practically heat treating a pellet at a time. Here is what this means to you:

Long abrasive life and low maintenance costs associated with the use of annealed abrasives often make this type of abrasive the most economical. Now—by a newly developed process of CONTROL—it is possible to produce annealed shot in three different and distinct hardness ranges with a narrow hardness range in each. This means that you can now buy an annealed shot in the exact hardness range to suit YOU—permits the selection of a hardness range that gives you the desired rate and degree of cleaning plus the lowest possible maintenance cost commensurate with the required degree of cleaning: by "fitting" your annealed shot to the job—you can save even more money.

Makes sense, doesn't it? And all we ask is to be permitted to determine what your exact hardness requirements are. This doesn't cost you anything—but if we're right—can save you a tidy sum of money.

Please write your name and address on the coupon below and mail it to the Hickman, Williams office nearest you. No obligation, of course. The most you can lose is a three-cent stamp.

PERMABRASIVE* SHOT AND GRIT *IS PRODUCED EXCLUSIVELY BY*
NATIONAL METAL ABRASIVE COMPANY · CLEVELAND, OHIO
AND SOLD EXCLUSIVELY BY
HICKMAN, WILLIAMS & COMPANY
(INCORPORATED)

CHICAGO · DETROIT
CINCINNATI · ST. LOUIS
NEW YORK · CLEVELAND
PHILADELPHIA · PITTSBURGH
INDIANAPOLIS

OK. You may determine our "size" in annealed abrasives, without any obligation on our part, of course.

Name_____

Firm_____

Address_____

City_____

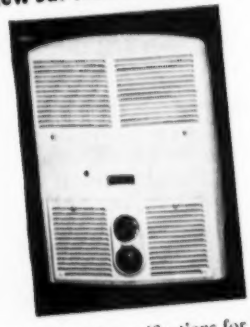
MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

*Licensed under
U. S. Patent No. 2184926
U. S. Application No. 619602

Wherever
It's
HOT
specify
Sicon

NEW
IMPROVED
SILICONE-BASE
HEAT-RESISTANT
FINISH

Protects Stewart Warner's
New Saf-Aire Wall Furnace



Quality finish specifications for this heating unit called for a coating that would stand 500° and still retain its color and gloss—a temperature far above that incurred in normal operation. Ordinary heat resistant coatings failed. SICON *Ivory* and SICON *Beige* worked perfectly...just as SICON has solved so many other finish problems. *Write for dynamic proof of SICON'S amazing stability under heat! New Brochure now ready.*

Sicon
Silicone-Base Finish is manufactured exclusively by
MIDLAND
INDUSTRIAL FINISHES CO.
Waukegan, Illinois
ENAMELS · SYNTHETICS
LACQUERS · VARNISHES

INDUSTRIAL MEETINGS

NAT'L PACKAGING EXPOSITION

American Management Association, national packaging exposition and conference, Atlantic City Auditorium, April 1-4.

LUBRICATION ENGINEERS

American Society of Lubrication Engineers, annual meeting, Statler Hotel, Cleveland, Ohio, April 7-9.

WELDING CONFERENCE

Third annual Welding Conference, Detroit, April 16-18, sponsored by the American Institute of Welding Engineers, the Detroit Section of the American Welding Society, and the Industrial Electrical Engineers Society of Detroit.

AMERICAN CERAMIC SOCIETY

The American Ceramic Society, annual meeting, William Penn Hotel, Pittsburgh, April 27-May 1.

INT'L LIGHTING EXPOSITION

The 4th International Lighting Exposition and Conference, Cleveland Auditorium, Cleveland, Ohio, May 6-9.

ELECTROCHEMICAL SOCIETY

The Electrochemical Society, 50th anniversary, Benjamin Franklin Hotel, Philadelphia, May 4-8.

LPGA CONVENTION, TRADE SHOW

Liquefied Petroleum Gas Association, convention and trade show, Palmer House, Chicago, May 12-14.

GAS APPLIANCE MFRS. MEETING

Gas Appliance Manufacturers Association, 17th annual meeting, The Broadmoor, Colorado Springs, Colorado, May 21-23.

ENAMELERS MAYPOLE PARTY

Midwest Enamelers Club, annual Maypole Party, Sportsman Golf Club, Chicago, May 23.

STOVE MFRS. ANNUAL MEETING

The Institute of Cooking and Heating Appliance Manufacturers, 20th annual meeting and exhibit, The Netherland Plaza, Cincinnati, June 2-4.

CHEMICAL INST. OF CANADA

The Chemical Institute of Canada, 35th annual conference and exhibition, Mount Royal Hotel, Montreal, June 2-4.

ELECTROPLATERS MEETING AND FINISHING EXPOSITION

American Electroplaters Society, 39th annual convention, Conrad Hilton Hotel, and concurrent Industrial Finishing Exposition of 1952, International Amphitheatre, Chicago, June 16-20.

HOMEFURNISHINGS MARKET

International summer Homefurnishings Market, The Merchandise Mart and American Furniture Mart, Chicago, June 16-26.

HOME LAUNDRY MFRS. MEETING

American Home Laundry Manufacturers Association, summer meeting, Mackinac Island, Michigan, July 27-30.

Mary Loftus, control chemist for J. P. Seeburg Corp., is one of five women honored with membership in the American Electroplaters Society. Total membership of technical society exceeds 5500 men.

MAC DRAW NO. 8*

helps produce millions of 20mm cartridge cases—from cup to case

WITHOUT DIE RE-WORK

To date, actual plant test shows more than 11,000,000 20mm cartridge cases completely finished without die re-working on any of the five separate drawing operations involved—and still going strong. No telling how high the number will ultimately go. This amazing feat is being accomplished by a large Mid-west manufacturer† through the use of our famous Mac Draw No. 8.

This Special Brass Drawing Oil, engineered for fast, accurate and uniform drawing with maximum lubrication for greater long-run die endurance, is doing a perfect job in the production of these cases. The Macco Company takes justifiable pride in this extraordinary record, as it does in the all-around perfection of each of its products.

Mac Draw No. 8 is only one of the many Macco Big 4 Pre-Tested chemical compounds and cutting oils that are today giving such over-all satisfaction in many of the country's leading civilian and defense steel production industries.

When you specify Macco, you know you are getting products tested and proved, under the same actual working conditions existing in your own plant.

†Manufacturer's name and actual case histories of many other satisfied users of Macco Products furnished on request.

Here are a few of the many items in the manufacture of which Macco "Know-How" is lending a powerful helping hand

- Shells, Projectiles, Rockets—all sizes.
- Cartridge Cases—from 50mm to 155mm, steel and brass.
- Tank Tread Connectors.
- Blitz Cans.
- Screw Machine Products.
- Jet Engine Parts.
- Bazooka Shells.
- Fuses.
- Tank Parts—Transmissions, Axles, Differentials.

** Mac Draw No. 8 was used on every operation, including Heading, Trimming, Tapering, Shaving, etc., without extra washing. Comes off clean in hot water.*

MACCO PRODUCTS COMPANY

CHEMICAL COMPOUNDS

Write Direct or Contact a Macco Representative Today

FOR THE METAL WORKING TRADE--SINCE 1931

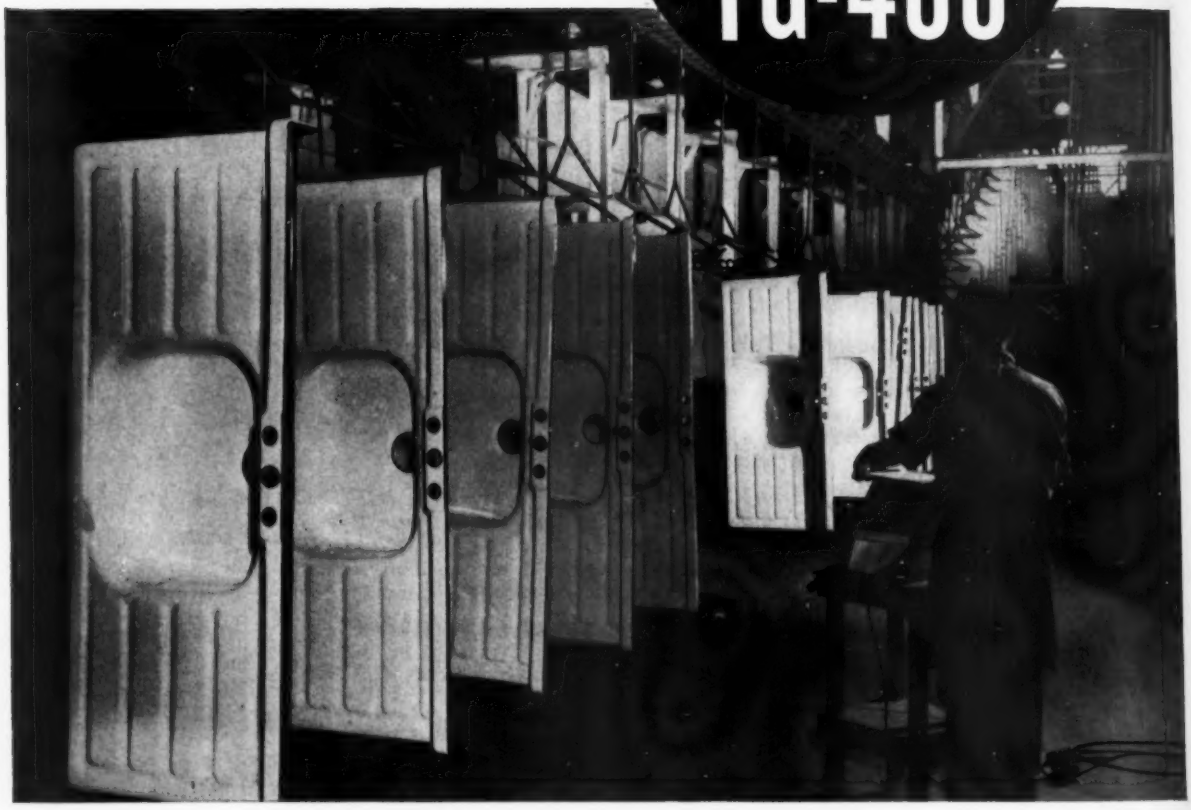
525 W. 76th STREET ★ CHICAGO 20, ILL.

You can have uniform

blue-white titania enamels

with

TITANOX-TG-400



Strict color uniformity in the blue range of the visible spectrum is just one of the advantages of TITANOX-TG-400. This non-pigmentary titanium dioxide is a modification of TITANOX-TG, differing from the latter only insofar as it produces the popular blue-white tint so much in demand. Otherwise its characteristics are those that have made TITANOX-TG the logical basis for formulating porcelain enamels.

TITANOX-TG-400 makes possible ultra-thin coatings that are highly resistant to corrosion, abrasion and shock. Yet it easily fits into any production set-up, being free-flowing, non-sticking and non-balling. Developed specifically for ceramic use, it is not affected by abnormal demands for titanium dioxide pigments.

Our Technical Service Department is always available for consultation on your problems in frit formulation. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

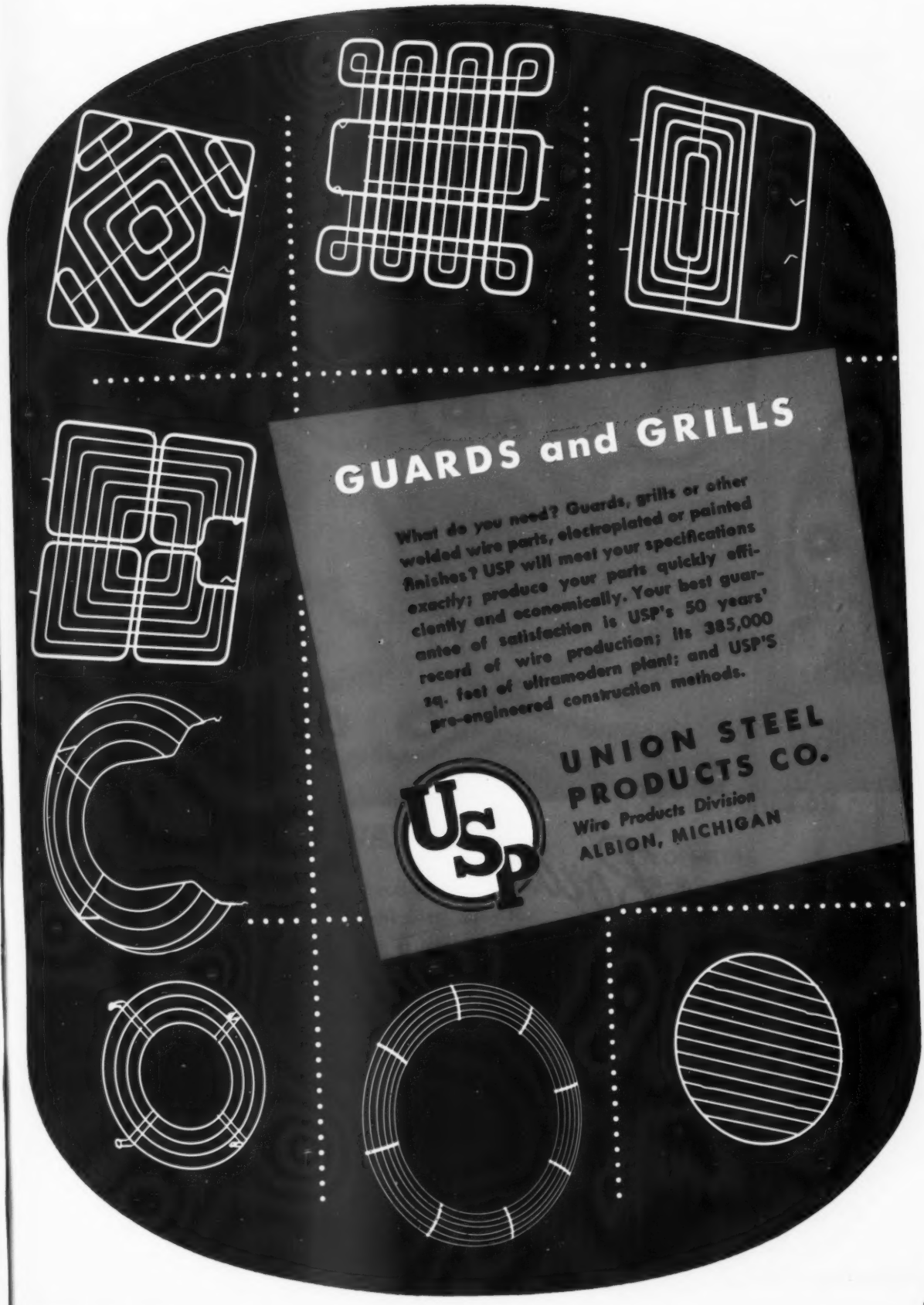
9777

® TITANOX

the brightest name in ceramics

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY


GUARDS and GRILLS
What do you need? Guards, grills or other welded wire parts, electroplated or painted finishes? USP will meet your specifications exactly; produce your parts quickly efficiently and economically. Your best guarantee of satisfaction is USP's 50 years' record of wire production; its 385,000 sq. feet of ultramodern plant; and USP'S pre-engineered construction methods.
USP
UNION STEEL PRODUCTS CO.
Wire Products Division
ALBION, MICHIGAN

Mining Borates

BORON, CALIFORNIA

This Borate Ore is used in the production of ANHYDROUS BORAX and the OTHER BORATES used by the Vitreous Enamel industry.

PACIFIC COAST BORAX CO.

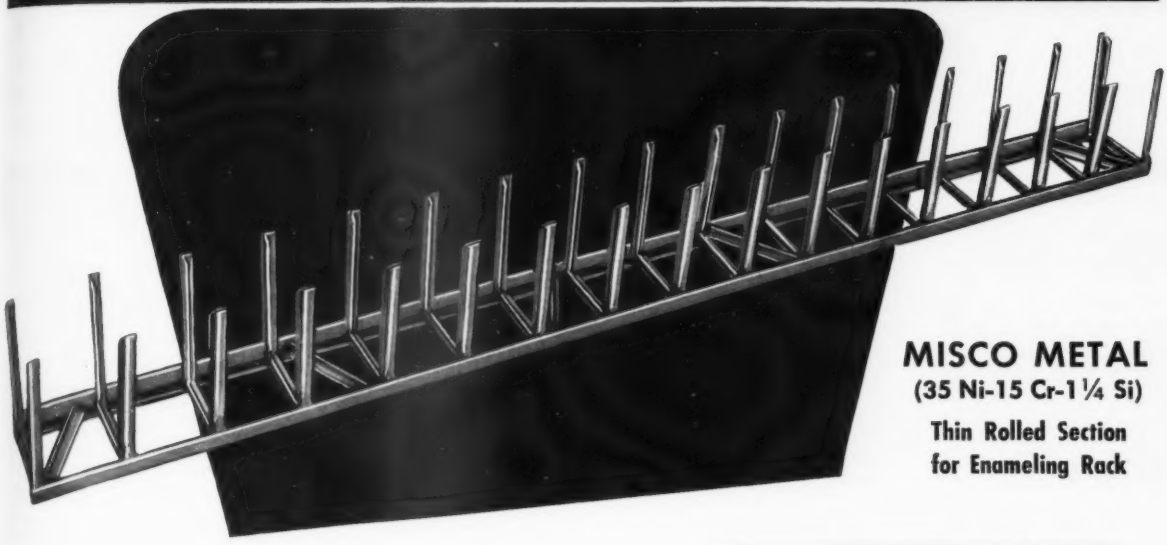
Division of Borax Consolidated, Limited

NEW YORK • CHICAGO • CLEVELAND • LOS ANGELES

MANUFACTURERS OF THE FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

It's MISCO *for* HEAT RESISTING ALLOYS IN ROLLED MILL FORMS

Sheets — Plates ▬ Rounds ● Squares ■ Hexagons ⬢ Flats ▬ Angles L
Channels ⊔ Sections ⌐¬ Pipe ○ Nuts ⬡ Welding Rod



MISCO METAL
(35 Ni-15 Cr-1¼ Si)
Thin Rolled Section for Enameling Rack

GOOD METAL

USED IN A GOOD DESIGN GOES A LONG WAY

FOR TWENTY-FIVE YEARS Misco Metal (35Ni—15Cr —1¼ Si) has been recognized as the ideal alloy for resistance against heat and scaling at temperatures from 1550 to 1800°F. And, now, in this period of metal restriction and allocation Misco Metal, as always, stands out as the best rolled heat-resisting alloy for fabricated enameling equipment. Misco Metal fabrications are stronger, more heat-resistant and last longer.

OUR BUSINESS IS WAREHOUSING Rolled Alloy Mill Forms of:

MISCO METAL
35 Ni–15 Cr–1¼ Si.....A.I.S.I. Type 330

MISCO B
25 Cr–12 Ni.....A.I.S.I. Type 309

MISCO K
25 Cr–20 Ni....A.I.S.I. Type 310

MISCO 430
17 Cr.....A.I.S.I. Type 430

ROLLED PRODUCTS DIVISION
Michigan Steel Casting Company

One of the World's Pioneer Producers and Distributors of Heat and Corrosion Resisting Alloys

4815 BELLEVUE AVE. • DETROIT 7, MICHIGAN

MISCO
Heat and Corrosion Resistant Alloys

Du Pont Announces

Vitreous Enamels for Aluminum

Durable vitreous enamel finishes for aluminum are now available *in a wide range of colors.* Developed and thoroughly field tested by Du Pont, these finishes offer the combined advantages of color appeal, durability and ease of fabrication. And they can be readily applied by the enameler using ordinary enameling and firing procedures.

WHERE ALUMINUM ENAMELS CAN BE USED

- Roofing
- Structural Siding
- Wall and Ceiling Panels
- Signs and Labels
- Furniture and Cabinets
- Tanks
- Architectural Tile
- Electrical Shielding
- Pipes and Fittings
- Appliance Parts

WHAT ALUMINUM ENAMELS CAN MEAN TO YOU

Du Pont aluminum enamels open new markets for enamelers and metal fabricators alike . . . permit wider use of lightweight aluminum alloys in both structural and decorative applications. Here's why:

COLOR APPEAL . . . Available in a wide range of colors and degrees of surface gloss.

DURABILITY . . . Du Pont aluminum enamels are light-fast and show excellent resistance to corrosion, abrasion, thermal shock, impact and flexing and have a high dielectric strength.

EASE OF FABRICATION . . . Enameled aluminum can be sheared, sawed, drilled and punched without damage to the coating—thus eliminating costly prefabrication.

INCREASED STRENGTH . . . A standard-thickness coating of vitreous enamel increases the rigidity of sheet aluminum as much as 70%. Increased rigidity means that lighter gauge material can be used—with substantial savings.

HOW ALUMINUM ENAMELS ARE APPLIED

Enamel slips used in the finishing process are prepared with specially adapted Du Pont frits and are based on Du Pont formulations. These formulations and other technical assistance in the application of Du Pont vitreous enamels on aluminum are offered to enamelers without charge. The coupon below will bring you full information. Clip and mail it today to: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Del.

DU PONT
VITREOUS ENAMELS
FOR ALUMINUM

DU PONT
REG. U.S. PAT. OFF.

150th Anniversary
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Delaware

Please send more information on Du Pont vitreous enamels for aluminum: Properties, uses, formulations, methods of applying, etc. I am interested in enameling the following types of work:

- ☐ Roofing
- ☐ Structural Siding
- ☐ Wall and Ceiling Panels
- ☐ Furniture
- ☐ Cabinets
- ☐ Architectural Tile
- ☐ Electrical Shielding
- ☐ Appliance Parts
- ☐ Signs and Labels
- ☐ Tanks
- ☐ Pipes and Fittings
- ☐ Other

*Name*_____ *Position*_____

*Firm*_____

*Street and No.*_____

*City*_____ *State*_____

THE finish LINE

HOW WHITE IS WHITE— is a rough way of stating a question that has been causing concern among the producers of all types of metal finishes, the manufacturers of all kinds of finished metal products and the consumer-users of the finished products for a good many years.

To state the problem simply and from the practical standpoint we raise the question — "Can white finishes for metal products normally used in groups (kitchen appliances for example) be standardized for color characteristics *as the consumer-user sees them?*" We believe that the answer can and should be "yes." At the same time we hasten to comment that the problem is not as simple as it appears in print and that the solution will be one that calls for the combined use of available technical skills and a spirit of cooperation between *all* of the segments of industry that are involved.

A technical and practical problem

If we were to start a discussion of the technical problems involved we would be using such terms as: spectrophotometer, reflectometer, diffuse and specular reflectance, Munsell notations, hue, value, chroma and other technical designations that are important to the technician and researcher but need not be included in a strictly "practical" evaluation of the problem.

We have received inquiries at **finish** from companies, large and small, concerning an existing source for a standard white that individual finished product manufacturers could voluntarily use for their own benefit and for the convenience of the final customer.

These inquiries raise two questions: (1) should white for metal products — particularly *appliances* for kitchen and laundry — be standardized, and (2) is there a technical and *practical* solution to the question of standardizing white finishes?

In our opinion, it should be possible to come up with an affirmative answer for both of the questions. However we are not primarily interested in our opinions. We *are* interested in determining the degree of interest in the problem, the possibility for getting action, and the chance for cooperation among metal products manufacturers, particularly those making major appliances.

Work has been done

We would be remiss in opening the question editorially if we failed to report the fact that considerable work has been done by important technical men in the appliance and finishes field over a period of years.

Some progress has been made by individual manufacturers in attempts to standardize white for appliances of their own make which are to be used together.

Some cooperative work has been carried out during recent years by technical representatives of major appliance producers and from the suppliers of both organic and ceramic finishes.

The National Electrical Manufacturers Association has a "Joint Sections Committee on Color of Kitchen Appliances" which has held productive meetings and appears to be nearing an approach to the problem.

Another opportunity for cooperation

It will be evident even if it is determined that white standardization is needed and wanted — and that it can be technically and practically accomplished — that even then there will be the question of cooperation by the majority of important manufacturers before the assumed ultimate benefits will accrue to producers and consumers.

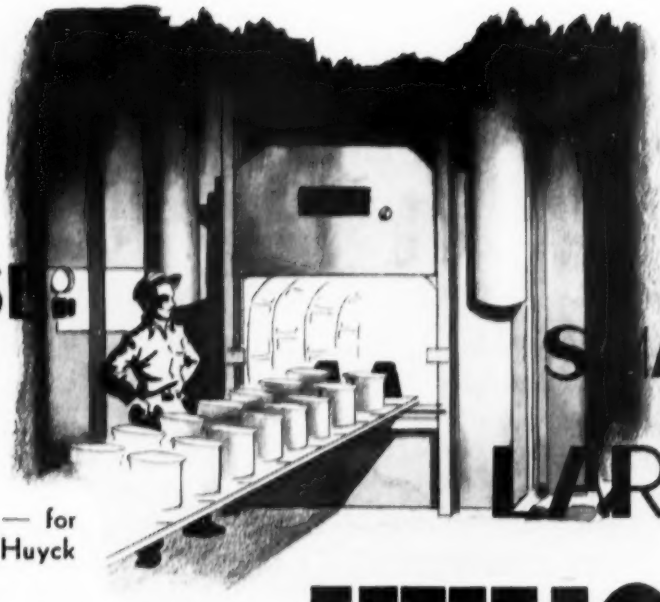
We will make the same offer that was made in connection with the now eminently successful National Safe Transit Program when the cooperative plan was first suggested by **finish**. We will help by offering an editorial sounding board for ideas and opinions and for promoting a standardization if and when it is proved to be desirable and practical.

Any **finish** reader interested in this problem is encouraged to express an opinion. Just state whether it represents a personal or a company opinion when you write.

Dana Chase

EDITOR AND PUBLISHER

PEACE or DEFENSE?



SMALL or LARGE it's HUYCK

Yes — small or large — for peace or defense — it's Huyck for a good furnace job.

Enameling furnaces, heat treating, forging and annealing furnaces, mill lining work, and smelters are just a few of the jobs we handle regularly.

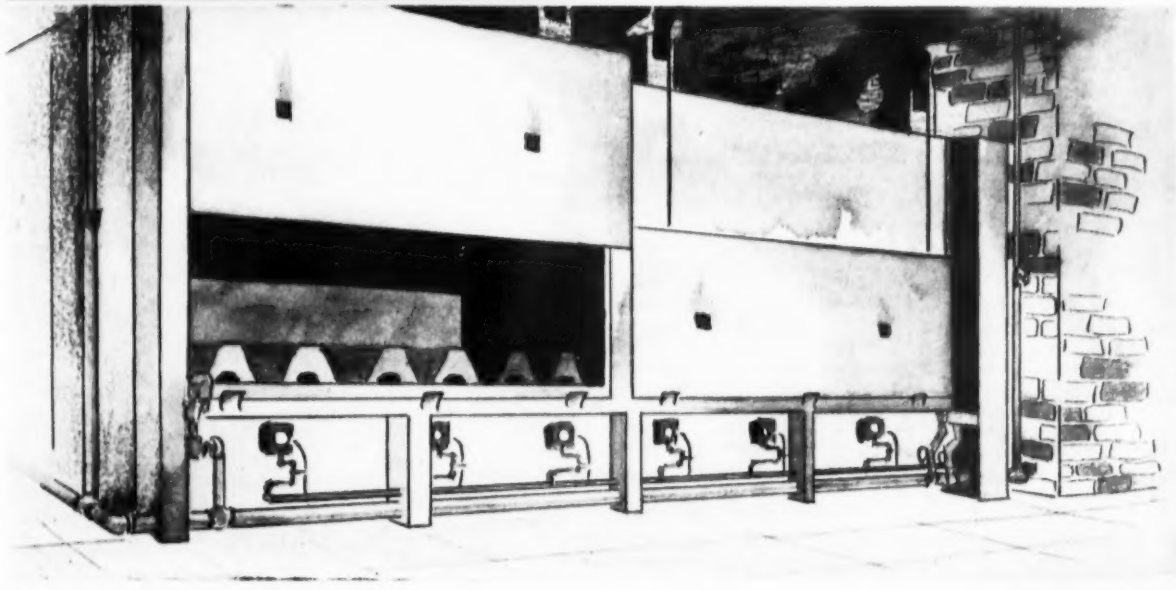
Firebrick masonry is a typical example of a specialized type of work. It requires the skill of experienced masons. And Huyck has the masons who have that skill. For almost a quarter of a century, Huyck has been doing an outstanding job in engineering masonry work for industry.

The fact is that, no matter what type of masonry construction is needed, Huyck is equipped to do the job quickly, efficiently and reasonably. Huyck engineered masonry gives you more for your masonry dollar. Call us in on your next job.

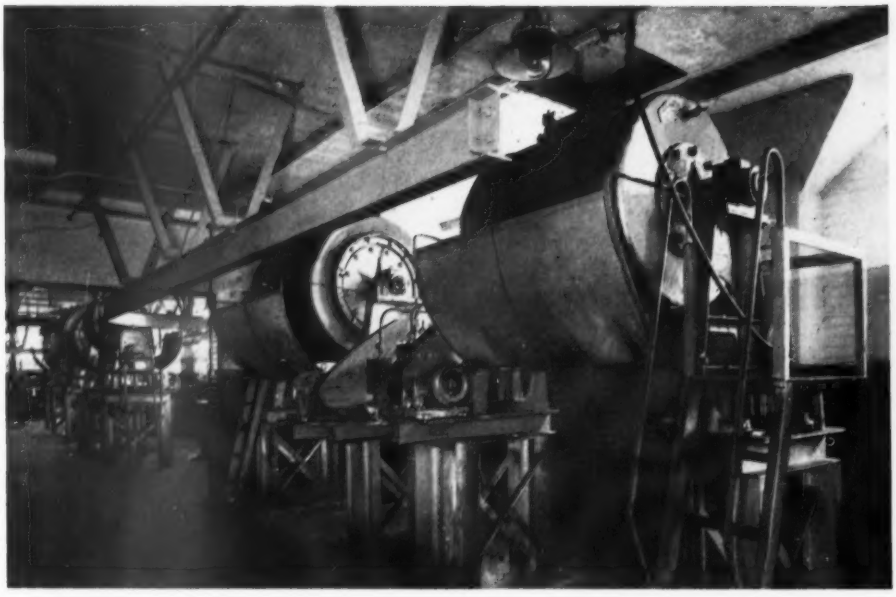
HUYCK CONSTRUCTION COMPANY

2946 North 78th Court • Phone: GLadstone 3-8604
ELMWOOD PARK, ILLINOIS

"HUYCK BUILDS ANYWHERE"



WHERE ARE THE HELP?



No, they're not out to lunch. Just a typical picture of a battery of PAUL O. ABBÉ PEBBLE MILLS in operation.

There's no help around because none is required while the mills are running. The only manual operation is for loading and unloading . . . one of many reasons why these mills are in operation, not only in the ceramic industry, but in hundreds of other industries.

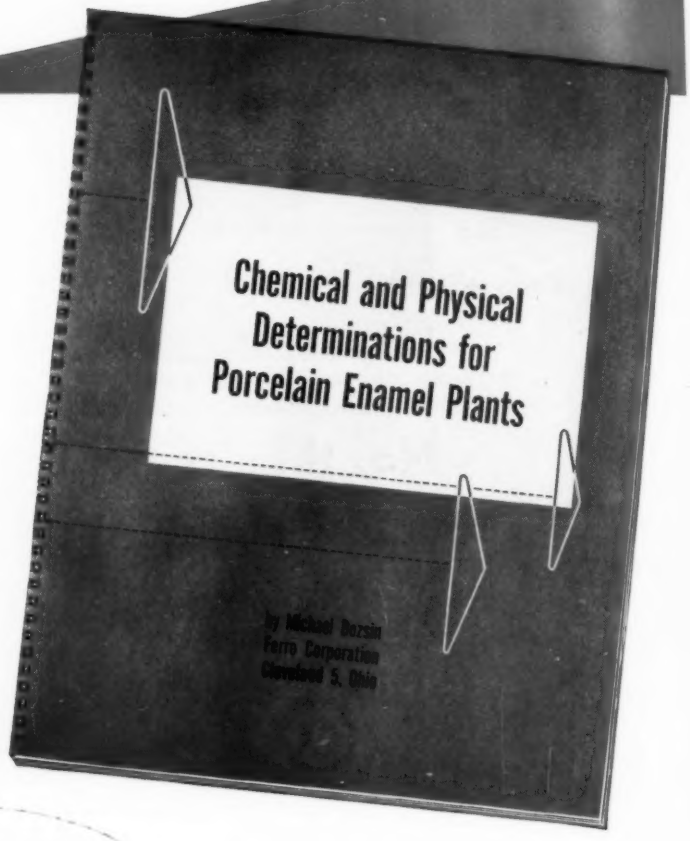
Send for Catalog "U" — Section "D" for data and illustrations.

PAUL O. ABBÉ INC

377 Center Avenue Little Falls, New Jersey

Ceramic Engineers

here's 20 years experience in Porcelain Enameling


Chemical and Physical Determinations for Porcelain Enamel Plants
by Michael Borsin
Ferro Corporation
Cleveland 5, Ohio

For improved quality . . .
For fewer rejects . . .
For lower operating costs . . .

All the information you need to completely investigate the chemical and physical conditions of a Porcelain enamel furnace and its effect on finished ware. Contains valuable tables, charts and reference material. Clearly illustrated. Produced for a permanent niche in your technical reference files.

Write for your free copy today!

Look to Ferro for leadership in Porcelain Enamel . . .

FERRO

FERRO CORPORATION
Porcelain Enamel Division
4150 EAST 56th STREET • CLEVELAND 5, OHIO

finish SUGGESTION BOX

A gauge for testing metal coating thickness

suitable for use with paints, ceramic coatings, plastic or paper

THE thickness of coatings can now be measured within .0005″ accuracy by a new instrument which has been built by the Ryan Development Laboratory. Designed by the National Bureau of Standards, the new device provides a non-destructive method for determining the gauge of protective coatings applied to non-magnetic materials. Fast and reliable, the technique employed can be used with curved surfaces as well as flat areas.

Instrument description and operating principle

The instrument consists of two parts: a plastic test head in which an electromagnetic probe coil is embedded and an inductance balance indicator which utilizes a galvanometer. Protruding through the coil is a slender plastic rod which is attached to a dial indicator gauge. This rod is free to move axially and its displacement is indicated by the gauge. The inductance balance unit incorporates an impedance bridge which can be adjusted by potentiometers to bring the galvanometer to zero reading when the electrical balance is attained.

The principle involved is the well-known change in inductance of a coil when it is brought in proximity to a metal surface. The metal acts as a sort of short circuiting device which critically affects the coil's inductance over very short distances.

Operating the thickness gauge

First step in the use of the instrument is to calibrate it with an uncoated sample of the same metal as that which is coated. The probe coil is placed against the metal surface with the plastic feeler rod in contact. The dial indicator is set to read "zero." The current is turned on and the inductance of the coil is established as a reference by adjusting the bridge until the galvanometer also reads "zero."

Wm. S. Cockerell, director Ryan development laboratory adjusts the new thickness gauge built in the laboratory to measure very thin ceramic coatings on stainless steel exhaust systems.

Then, the coil is transferred to the surface of the coated part. Its distance is adjusted until the galvanometer reads "zero." This will occur when the coil is the same distance from the conductive metal as it was when the calibration was made. At this point, the plastic feeler rod will be displaced in exact amount equal to the thickness of the coating. This distance can be read directly from the dial indicator gauge in divisions of .0001″.

The process lends itself to the measurement of any non-conducting coating such as paint, ceramic, plastic or paper. The only restriction on the base metal composition is that it have a magnetic permeability of not much more than unity. For good accuracies, the thickness of the base materials should be greater than the depth of penetration of the magnetic field. This is approximately a minimum thickness of .025″ for highly conductive materials, and .050″ for metals with high resistivity.

Ryan researchers will put the new instrument to valuable use by analyzing ceramic coatings on Ryan components which are in actual airline service. With 2000 hours of flight test on Pratt & Whitney R-4360 engine headers, fabricated from various metals and coated with Ryan ceramics, laboratory analysts have a rich field to assay. In addition to these Stratocruiser engine parts, Ryan is producing ceramic coated components for 240 Convair-Liners, Douglas DC-6 airliners, Boeing C-97 and B-50 military aircraft and Continental-powered Patton tanks. These assemblies will also provide excellent opportunities to correlate optimum ceramic thicknesses with maximum service life.

Ryan ceramic research has shown that even small differences in thickness of the coatings may materially affect the protective properties of the ceramic when used with high temperature exhaust systems. Consequently, the new instrument will also be used to inspect new Ryan components and maintain production coatings at the gauges which research and investigation prove to be the most efficient.

NEW RESEARCH PRODUCTS FOR METAL FINISHING

ALKALINE DERUSTING COMPOUND 134

FAST ALKALINE PICKLE FOR IRON

Derusts and pickles steel, cast iron, alloy steels, tin coated steel, high carbon steels without any etching, darkening or attack on the base metal. Operates at room temperature. Fast action. No acids used. Ideal for reclaiming of tools, gears, fixtures and preparing work for plating, galvanizing, tinning painting and enameling.

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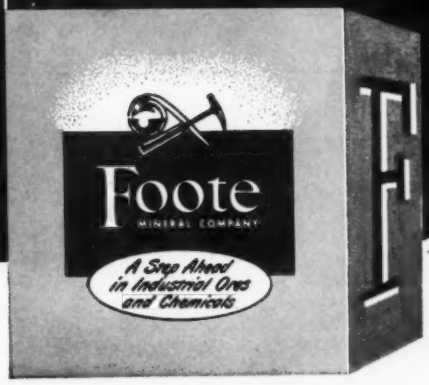

FOOTE MINERAL COMPANY

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412 Eighteen W. Chelten Building, Philadelphia 44, Pa.
PLANTS: Exton, Pa.; Kings Mountain, N. C.

Relationships between color, type of alkali ions and adherence of ground coats containing cobalt oxide

by H. C. Marshall • CERAMIC ENGINEER, CARROLL CLAY COMPANY, CARROLLTON, OHIO; AND
R. M. King • FINISH TECHNICAL CONSULTANT, AND PROFESSOR OF CERAMIC ENGINEERING, OHIO STATE UNIVERSITY, COLUMBUS, OHIO

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Most theories for the adherence of ground coat enamels containing cobalt oxide envisage some sort of mechanical bond which is attributed to either a rough surface or to some intermediate layer such as an oxide or a precipitated metal between the enamel and the metal base. It is known, however, that many other types of coatings do not depend upon such mechanical bonds for adherence. Some instances have been cited previously by the author.[1] Explanations for adherence in these cases have been based upon electrical or chemical bonds known to exist in all surfaces and which arise from unbalanced forces existing in the surface atoms or ions. Weyl[2] has proposed a theory, based on the existence of such forces, to explain the special role of cobalt oxide as a promoter of adherence in conventional sheet steel ground coats.

In brief, Weyl's theory states that the cobalt ion is always divalent and that it is capable of surrounding itself with either six or four ions of oxygen, depending upon the availability of oxygen ions and the competition for the oxygen between the cobalt ions and other cations such as alkali ions. According to Weyl: (1) cobalt ions surrounded by six oxygen ions, thus forming CoO_6 groups, are pink in color, that is they absorb blue light, and those surrounded by four oxygen ions, forming CoO_4 groups, are blue in color as they absorb red light; (2) because of a higher degree of saturation the pink cobalt ionic groups have lower adhering powers than the blue groups; (3) alkali ions of low atomic weight, such as lithium ions, encourage the formation of pink groups and hence would tend to decrease adherence while alkali ions of higher atomic weight such as potassium ions, encourage the formation of blue groups and hence would tend to increase adherence.

Even though some other facts regarding the fine structure of glass and crystals supply contrary evidence, it was deemed desirable to check this theory experimentally. The data shown in Table I (published by King[3]) summarizes the results of some preliminary tests.

Admittedly the methods used in determining adherence and color were crude but more accurate methods were not available at the time these tests were made. Also the compositions of the glasses were different from those of commercial enamels and because of their solubility could not be applied by the usual methods. It may be significant however that in all tests the greater part of the area of break occurred within the glass rather than between the glass and metals. This is characteristic of cobalt-bearing ground coats but not of ground coats in which cobalt oxide is absent. Furthermore, it will be noted that even glasses containing beryllium fluoride had substantial adherence to iron. This is surprising in the light of the role assigned to free oxygen bonds and in the light of the findings of Weyl indicating that when halogens are substituted for oxygen, free bonds are not made available and adherence is reduced.

Owing to the development of an adherence meter and the availability of a spectrophotometer and an industrial sponsorship[4], it has been possible to conduct a more accurate and comprehensive study of this problem.

In view of Weyl's stated relationship between the colors of cobalt ions and the weights of the alkali ions, attempts were made to develop ground

Table I

Glass Composition	Color		Adherence
	Hot	Cold	
99.2 B_2O_3, 0.8 Co_3O_4	Blue	Reddish Violet	Fair
12.9 Na_2O, 87.3 B_2O_3, 0.8 Co_3O_4	Blue	Purple	Good
6.3 Na_2O, 92.9 B_2O_3, 0.8 Co_3O_4	Blue	Blue	Good
30.8 Na_2O, 68.4 B_2O_3, 0.8 Co_3O_4	Blue	Blue	Good
99.2 BeF_2, 0.8 Co_3O_4	Lt. Blue	Lt. Blue	Good
24.1 Na_2O, 34.7 B_2O_3, 40.4 SiO_2, 0.8 Co_3O_4	Blue	Blue	Good
98.7 BeF_2, 1.3 $CoCl_2$	Pink	Pink	Fair

Table II

Raw Batch Weights of Frits

	A	*B*
Potash feldspar	20.0	32.3
Quartz	30.0	16.1
Soda ash	—	4.7
Fluorspar	3.0	5.8
Boric acid	25.0	25.1
Potassium carbonate	—	12.2
Potassium nitrate	—	3.7
Lithium carbonate	18.5	—
Cobalt oxide	0.5	0.5

coats with high cesium and potassium ion concentration on the one hand and high lithium ion concentration on the other. An enamel of the latter type was easily developed, and is represented by enamel "A" in Table II. Enamels containing cesium or potassium ions exclusively and having maturing temperatures of 1550-1650°F. were not developed but one high in potassium ions but low in sodium ions and maturing at about 1700°F. was produced. See enamel "B" in Table II.

Raw batches of 2000 grams were melted and after fritting they were dry milled to pass a 40 mesh screen. For enamel slips, batches of the following mill formula were prepared:

Frit	100.00
Sodium nitrite	0.50
Enameling clay	7.00
Distilled water	40.00

Fineness of the ground enamel as determined by the test of the Porcelain Enamel Institute was 4-8% on 200 mesh.

Twenty gauge test specimens of enameling iron were pickled in the conventional manner but without a "nickel flash". The ground coats were adjusted to a "pick up" that would produce a fired thickness of 0.004" and were applied by dipping.

TABLE III

Adherence Ratio and Extinction Ratios for Enamels B and A

Ratio of Adherence of B (High K+) to Adherence of A (High Li+) = 0.26

	850	800	750	700	480	450	400
$R_1 \frac{(E_K)}{(E_{Li})}$	1.470	1.875	1.725	1.950	0.546	0.598	0.565

More blue centers in K Enamel ← → Fewer red centers in K Enamel

Table IV

Processing, Adherence and Light Absorption Data for Blends of Enamels A and B

(Cobalt Oxide = 0.5%)

	Blend	Firing Temp.	Firing Time	Adherence	$R_2 \frac{(E_{700})}{(E_{400})}$
100% A	(High Li)	1550°F.	3 Min.	60.4	1.00
75% A, 25% B		1600°F.	3.5 Min.	72.2	1.11
50% A, 50% B		1650°F.	3.5 Min.	78.2	1.23
25% A, 75% B		1650°F.	4.5 Min.	61.8	1.45
100% B	(High K)	1700°F.	3.25 Min.	15.7	3.44

Firing was accomplished at temperatures indicated in Table IV.

Adherence tests were conducted according to the procedure recommended by the Porcelain Enamel Institute in Technical Bulletin T-17.

For color transmission tests small batches of frit were melted in small fireclay crucibles. From these melts were cast discs having a diameter of about two inches and a thickness of about five millimeters. They were then annealed by placing in an electric furnace at 500°C. and cooled to room temperature within about five hours. After cooling they were ground and polished to a thickness of about two millimeters and then cut into 12 x 35 millimeter rectangles. Light transmission was measured by means of a Beckman type DU spectrophotometer.

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FIG. 1 HIGH LITHIUM ENAMEL (A)

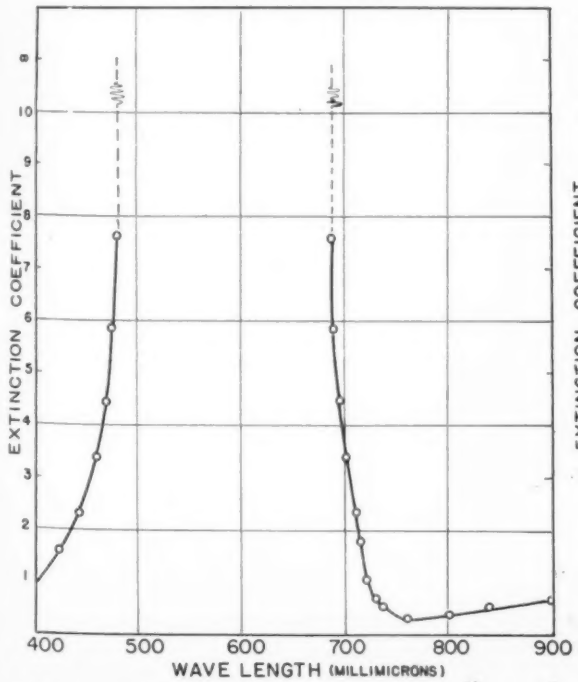
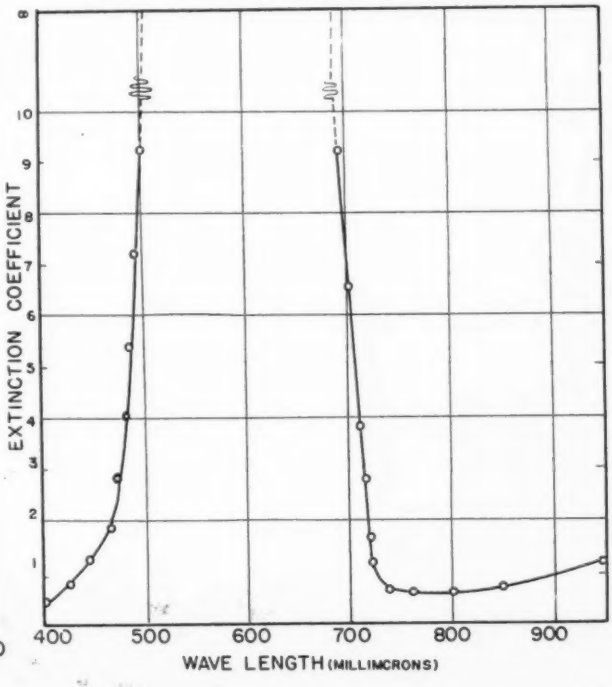


FIG. 2 HIGH POTASSIUM ENAMEL (B)



In the press room — *flat pieces of steel are stamped into end panels, shelves and dozens of other parts by a series of special dies in presses run by trained operators.*

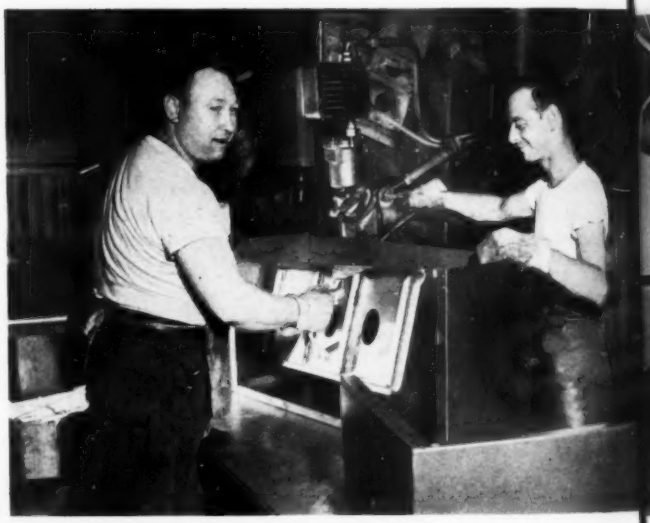
Mullins Plant #3

THE people, machinery, equipment and buildings that make up Mullins Manufacturing Corporation's Plant No. 3, Salem, Ohio, are a vital part of the Mullins organization.

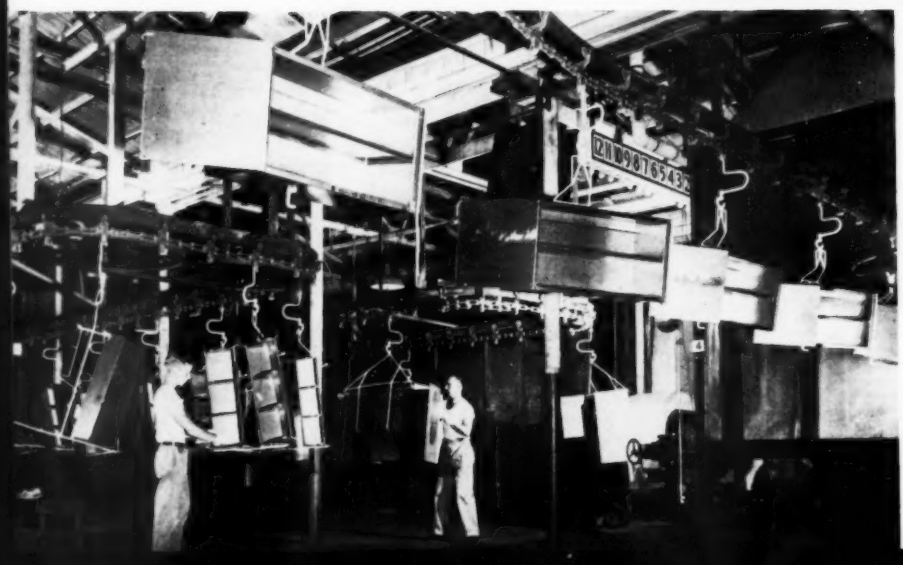
Located three blocks south and east of Mullins main plant, Plant 3 has a colorful background, rich in history, service and accomplishment.

Mullins purchased the building in 1925 from Silver Manufacturing Corporation, makers of farm machinery. Among the first products made in the plant by Mullins workmen were steel radiator enclosures to cover and beautify the radiator fixtures common at that time in offices and homes all over the country. Other early products made at the plant included stampings for the Mullins steel boats that graced lakes, rivers, ponds and parks all over the world, and some of which were taken on Admiral Peary's trip to the North Pole.

Mullins workmen then made automotive parts — tops, doors, running boards, cowels, etc., for General Motors,



Spot welding — *wall cabinets in the black-shape department. Teamwork is the keynote of this type of operation. Parts come to the welders from workers up the line; their work goes on down the line to others.*



Cabinet washer — *in operation only a few months — washes, rinses and dries cabinets prior to enameling. Washing removes grease and dirt from the metal. Workers are shown placing "what-nots" and cabinets on the washer conveyor.*

a non-technical photo story of production of special Youngstown Kitchens products

Willys, Pierce Arrow and Nash. They made washing machine wringers, and evaporators for Kelvinator and Westinghouse refrigerators, and later cabinet sinks for Whitehead.

When Mullins, at Salem, and Youngstown Pressed Steel Company, in Warren, merged and began to make the Youngstown Kitchens, Plant 3 made wall and base cabinets.

Ammunition boxes, sand guards for tanks, radar mounts and lids for Navy rocket cans were some of the badly needed equipment that came off the assembly lines at Plant 3 during World War II.

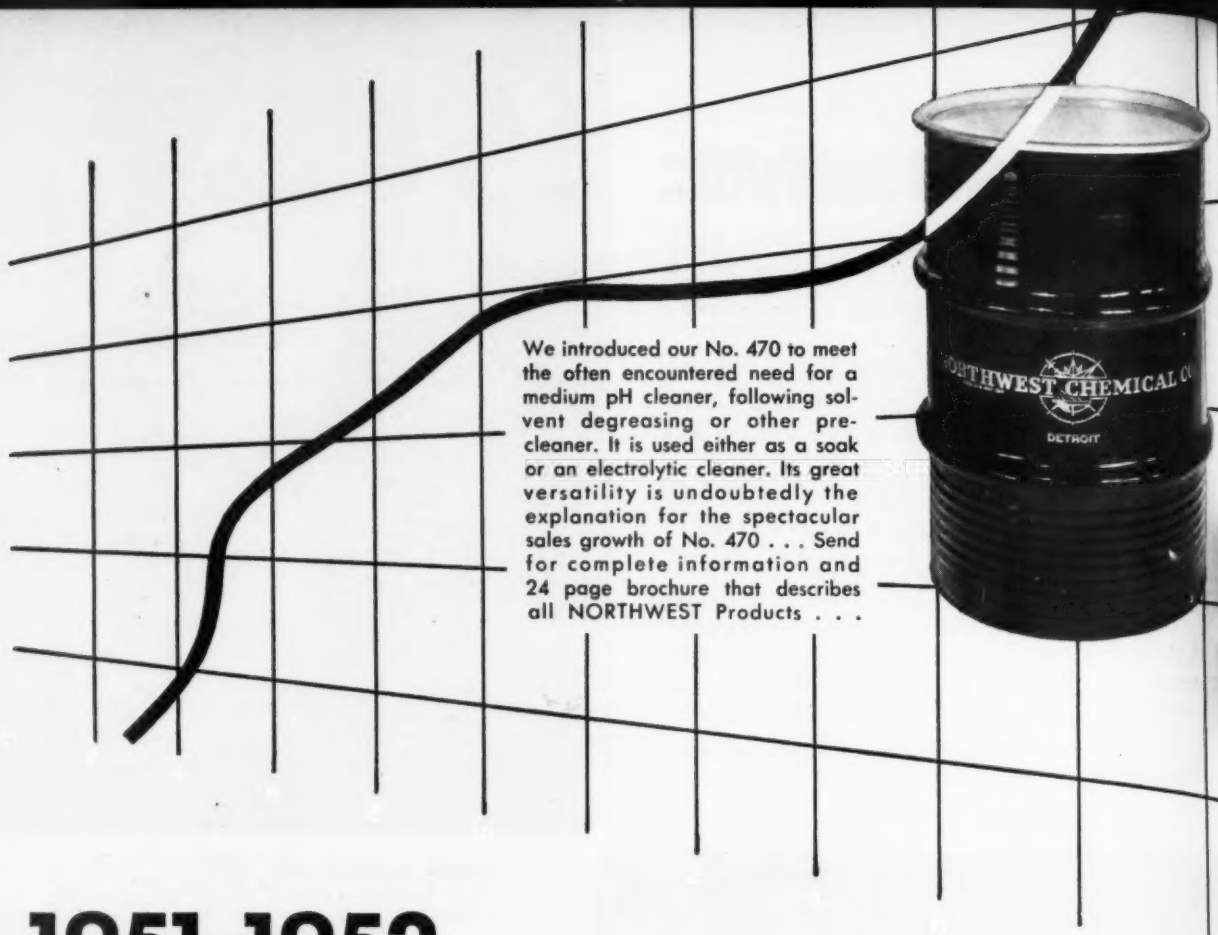
Today finds Plant 3 once again making Youngstown Kitchens products. Wall cabinets, broom cabinets, what-not shelves, cutlery trays, special tops and special cabinets are among the items shipped.

Packaging operations and a special materials handling job are shown on Page ST-3.

Special cabinets and tops — *are made at Plant 3. Here, Frank Weitz, of the specialties department, confers with Russ Limestahl, plant superintendent.*

In spray booth — *painters cover linen and broom cabinets with coats of enamel. Masks protect the sprayers, while water tanks collect overspray. Each painter covers only certain section of cabinet.*

On assembly line — *handles are fastened to cabinet doors. First worker starts the fastening process which is completed by second worker with aid of air-driven screw-driver. About 50 women are employed for similar jobs requiring deft hands.*



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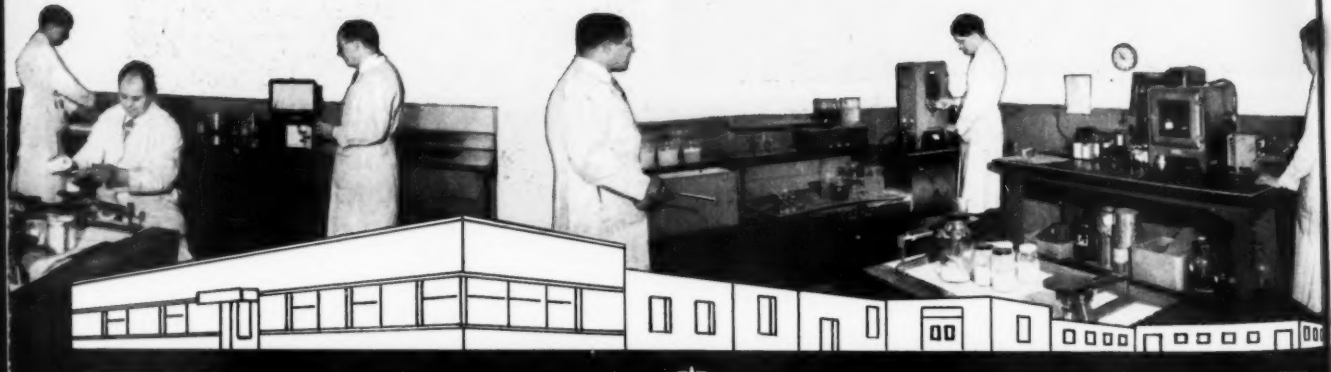

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Hard chrome plate in maintenance

a method of reconditioning hard-to-get tools during current period of tool shortages

by Gilbert C. Close • WESTERN EDITOR

DEFENSE PRODUCTION FEATURE

A nation-wide machine tool shortage is already hampering some industries and literally hamstringing others. The availability of machine tools to any company depends on that company's status in the defense program. Prime manufacturers of defense equipment (aircraft, tanks, military ordnance, etc.) are highest on the availability list. The availability of machine tools to other companies scales downward according to the importance of their product in the defense picture.

This places home appliance manufacturers in a precarious position unless they are heavily engaged in defense production. While most such companies are still adequately, or at least substantially tooled, replacement tools and new tooling will not be readily available until the current tense world situation relaxes. No one knows when this will occur. The only safe solution to the problem is a definite and clearly defined program to keep the tooling now in use in a workable and efficient condition until new tools become available. Failure to develop such a maintenance and tool salvage program may endanger future production.

In developing and planning a tool maintenance program, hard chrome plating should receive serious consideration, along with other tool maintenance and salvage processes. The use of hard chrome deposits to rebuild and salvage tool elements proved a life-saver in many companies during the tool shortage era of World War II. The process has proven its value, and there is nothing extremely complex in its use. Most parts rebuilt or salvaged by hard chrome plating will be equal to or better than new parts, both as to wearability and accuracy of dimensions.

It is the purpose of this article to discuss hard chrome plating, its applications in salvage and maintenance work, and to give sufficient data on the process so that it can be incorporated in a tool maintenance program to accomplish the most desirable results. This data was gathered first-hand by the author while on the engineering staff of a large aircraft company where hard chrome maintenance was used extensively during World War II. It is supplemented by recent surveys in job shops specializing in hard chrome plating, both on production parts and in many types of salvage and maintenance work.

While hard chrome plating is essentially a production process, used where production components must be given an extremely hard, wear resistant, or heat resistant surface finish, these same process attributes are ideally suited to many types of machine tool maintenance work. Parts that are worn beyond use, or have been reduced by heat oxidation beyond use, can be rebuilt by hard

Check dimensions of a machine tool prior to plating. In a good hard chrome plate job, finished dimensions will be proportional to unplated dimensions. Pre-sizing part or tool makes it unnecessary to do any finish grinding.

Table 1 — Physical Properties of Electro-Deposited Chromium

Density (as deposited)	6.93
Density (after annealing)	7.15
Melting point	3488° F.
Electrical resistivity	13.1 to 19.3 x 10^{-6} ohm/cm^3
(This indicates volume not surface resistance. Surface resistance is quite high, and when good conductivity is required across chromium plated surfaces, a bonding jumper may have to be used.	
Reflectivity	60 to 66%
Coefficient of expansion (as deposited)	Nil
Coefficient of expansion (annealed)	4.99 to 6.05 x 10^{-6}

Table 2 — Representative Coefficient of Friction Values

(Note lower friction and non-seizure values whenever a chromium plated surface is involved.)

	Static	Sliding
Chromium plated steel on chromium plated steel	0.14	0.12
Babbitt on chromium plated steel	0.15	0.13
Steel on chromium plated steel	0.17	0.16
Steel on babbitt	0.25	0.20
Babbitt on babbitt	0.54	0.19
Steel on steel	0.30	0.20

chrome plating to accurate dimensions, and given a surface wearability and hardness usually exceeding their original condition. In the same vein, parts that have been mis-machined undersize, or have been given undersize dimensions due to blueprint error, can be efficiently rebuilt by hard chrome plating at a cost far below that of replacement.

Companies already equipped with hard chrome plating equipment for use in production can use these same facilities for maintenance and salvage work. Companies without hard chrome plating equipment can make use of the many job shops specializing in this type of work. Usually, these job shops are willing to plate specific parts to specification, and at a cost commensurate with the value of the part.

A list of possibilities

It would be impossible to list all the possible uses of hard chrome plating in salvage and maintenance work, but a partial list will serve as a guide. Small tools that can be salvaged or given longer life by the process include reamers, taps, broaches, thread chasers, router drills, twist drills, milling cutters, and spinning tools. Salvage plating of hydraulic pistons and piston rods, bushings, bearings, and similar wearing parts is common practice. Molds for plastics or rubber parts, tapered-jaw tools, mill tools, etc., are more specialized tools that can be salvaged or rebuilt to size by hard chrome plating. As an example of the wearability of hard chrome plate in these applications, it can be pointed out that oil well rock bits are commonly chrome plated to increase their service life and retain better cutting edges.

Deep tank (16 feet deep) used to hard chrome plate long rolls, shafts, etc. Note substantial contacts used to carry heavy plating current.

A brief discussion of the physical and metallurgical properties of electro-deposited chromium will be more revealing of possible uses than any listing of specific applications. First, it should be noted that there is no similarity (except for appearance) between decorative chromium plating and hard chrome plating. Decorative plating, usually from 0.00001 to 0.00003 inch in thickness, is applied over a substrate of copper or nickel, and for the sole purpose of improving appearance. The substrate must be used to prevent corrosion as the thin chromium coating is porous in nature and offers little protection for the base metal. On the other hand, the hard chrome plate is applied directly to the base metal, without a substrate, and in thicknesses ranging from 0.0003 to 0.030 inch. This is sufficiently thick for the chromium to evidence its own physical characteristics, such as wear and heat resistance, during subsequent use.

Four desirable metallurgical characteristics

Electro-deposited chromium exhibits four metallurgical characteristics that fit it very well to salvage and maintenance work. These are extreme hardness, heat resistance, resistance to abrasion, and low coefficient of friction. Table No. 1 lists other desirable properties. When applied over substantial base metal, plated chromium exhibits a hardness ranging between 700 and 1000 Vickers (1000 to 1200 Brinell). This places it about 9 in the Mohs scale (used to rate diamond hardness, with diamonds rated at 10).

Plated chromium's low coefficient of friction makes it ideal for use wherever slide wearing action will occur, such as on pistons, piston rods, cylinder walls, etc. Comparative coefficients of friction are listed in Table

No. 2. This low friction is further enhanced by very low seizure properties that are highly advantageous in reciprocating wearing actions where the wearing surfaces come to a full stop during each cycle of operation (such as a piston operating within a cylinder).

The resistance of plated chromium to heat oxidation is highly advantageous in many types of salvage and maintenance work. The plating can be exposed continuously at temperatures ranging upward to 1000°F. without discoloration or other adverse effects on its physical properties. This characteristic is often utilized when it becomes necessary to rebuild or salvage hot-running engine and turbine parts, compressor units, etc.

Masking a mill roll prior to plating. Masking tape has been used on the upper portion, while the mechanic is fitting a sheet metal shield around the lower end. No chromium will be deposited from plating solution that seeps behind the shield.

Treatment for hydrogen embrittlement

It is only normal that the extreme hardness of plated chromium gives it a tendency toward brittleness. This is emphasized to some extent by hydrogen embrittlement during plating. Hydrogen embrittlement is more severe in chromium plating than in most plating processes due to the relatively low efficiency of the plating solution employed and excessive formation of hydrogen gas. This brittleness of the electro-deposit may result in chipping and spalling on sharp corners when the deposit is thick and the service loading heavy.

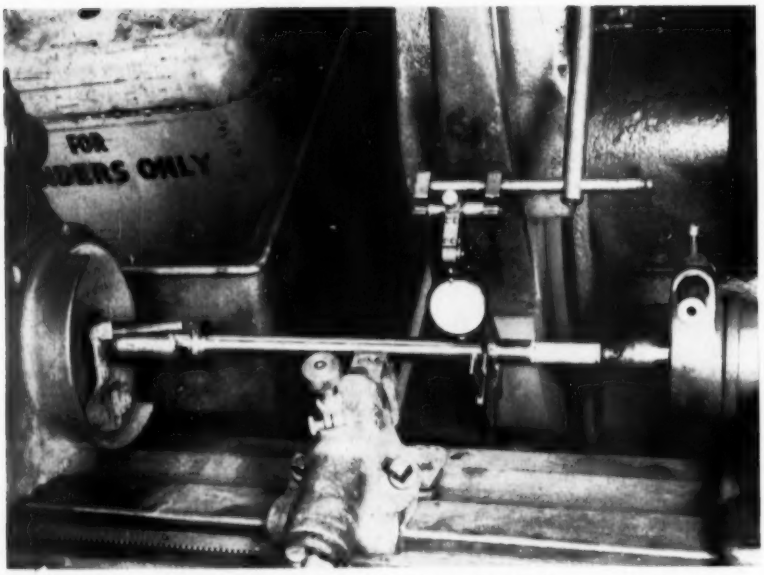
When the chromium is deposited on high carbon or cold-rolled steels, hydrogen embrittlement relief is highly recommended. This is accomplished by heating the plated parts at 375°F. for about three hours after plating. While this heat treatment does not affect the brittleness of the plate metal itself, it removes the brittleness from the underlying base metal by driving off the hydrogen accumulation.

Successful hard chrome salvage plating depends greatly on proper preparation of the tool or part prior to plating. It should be remembered that electro-deposited chromium will not fill in or cover any defects or irregularities that exist on the surface of the base metal. Checks, pits, scratches or ridges in the base metal will, if anything, be emphasized on the surface of the plated deposit. This is due to the peculiar "throwing power" of the chromium plating solution which tends to deposit excess metal on sharp corners, ridges, etc. Thus the surface finish of the part or tool to be plated will have to be equal to or better than the finish required on the plated part.

Checking the hardness of the plating on an engine shaft. A good deposit will average in hardness between 700 and 1000 Vickers (Moh Scale No. 9).

Suggestions for surface finishing before plating

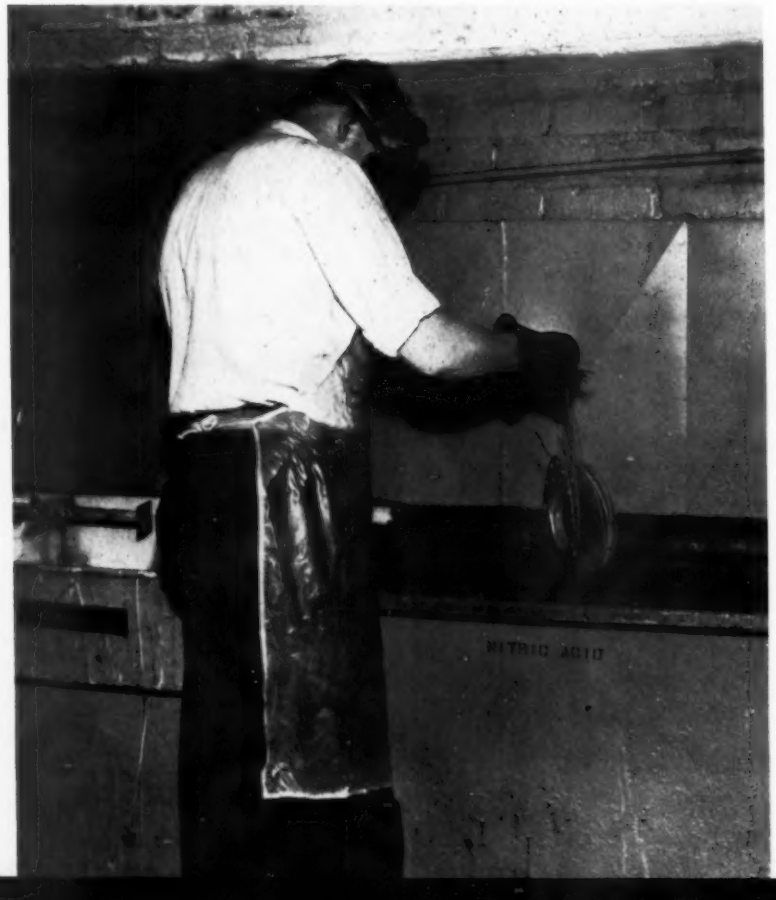
The degree of pre-plating surface finish necessary depends, of course, on permissible tolerances and the degree of finish required in the plated part. It is much better to properly prepare the surface beforehand than to attempt to grind or buff away surface irregularities after plating. Grind-



Using a centerless grinder to finish grind a hard chrome plated shaft. Cutting wheel should be somewhat softer and more free-cutting than wheels used for hardened tool steel.

ing or buffing after plating may remove the plated deposit entirely from specific areas, leaving exposed base metal minus the benefits of the chromium deposit. For ordinary work, what is termed a "smooth" pre-plating finish will suffice. For more critical work, a "light buff pre-plating finish" is often used. When plated part tolerances are very narrow, or when a high degree of plate smoothness is required, what is termed a "high color buff pre-plating finish" is commonly used. Specifically, the "high color buff" indicates that the part or tool has been made as smooth as possible prior to plating.

Pickling parts to be hard chrome plated in a nitric acid solution to remove light rust and scale. Sandblasting is recommended when it becomes necessary to remove heavy rust and scale.



Operation of the chromium plating process during salvage or maintenance plating is the same as when doing production plating. The one big difference is in proper preparation, cleaning and mounting of the part or tool to be rebuilt. As already noted, the pre-plated finish on the tool will have to be as good or better than finished requirements. Often, too, shop tools and apparatus will be contaminated with multiple soils gathered during the tenure of its service. These soils must be thoroughly removed, and will often require more stringent measures than mere alkaline or trichlorethylene cleaning baths.

Cleaning and masking

Sandblasting is usually employed to remove heavy rust, oxides and surface scale. For light rust deposits or light scale, a nitric acid pickling bath will suffice. After this initial cleaning, the work should be degreased at elevated temperature to make sure that all traces of grease, oil, or other organic substances are thoroughly removed. Parts should be left in the degreaser until they reach vapor temperature.

The next step is proper masking. Very few parts or tools will require overall plating. Several masking materials are in common use including various tapes that are resistant to the chromium plating bath, various stop-off lacquers, or ordinary thin sheet metal wrapped around the area to be masked and held in place with fine wire. The purpose of the mask is to provide a direct barrier between the plating solution and non-plated areas. There will be no chromium deposit from any solution that happens to seep behind the masking material. Some ingenuity is required to select the proper masking material and apply it in a manner to obtain desired results.

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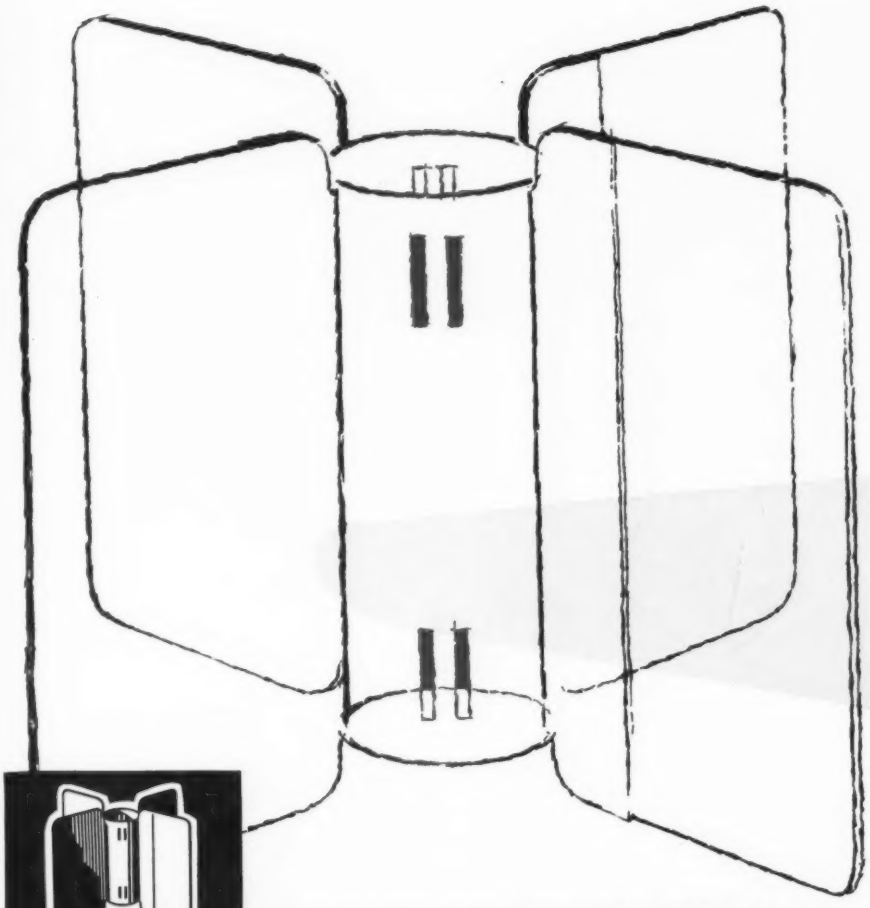

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American Ceramic Society to meet in Pittsburgh

headquarters for fifty-fourth annual meeting will be the William Penn hotel

EARLY registration figures for the American Ceramic Society's 54th annual meeting indicate that last year's record attendance of 2074 may be exceeded this year. The convention will be held at the William Penn Hotel, Pittsburgh, Pa., from April 27 through May 1.

Samuel G. Hibben, director of applied lighting, Lamp Division, Westinghouse Electric Corp., and president of the Illuminating Engineering Society, has been scheduled to address the ACS general session on the topic "Bottles for Light—A Problem for Tomorrow."

A top entertainment feature will be U.S. Steel's Homestead District Male Chorus. The chorus, 28 voices strong, are employed in steelmaking jobs ranging from ladle cranemen to structural steel rollers. The singers have appeared on U.S. Steel's "Theatre Guild on the Air."

Eighteen plants and research laboratories in the Pittsburgh district are making their facilities available for tours scheduled for the last day of the meeting.

School dinners will be held the evening of April 28, with arrangements being prepared by the individual schools.

Members of Keramos, national professional ceramic engineering society, will band together at the meeting to help celebrate that organization's 50th anniversary.

The Student Speaking Contest, sponsored by the Society, will be divided into two phases. The first will be on Sunday afternoon, April 27, when all the speakers will compete. In the evening, finalists will address the entire meeting audiences. Monetary awards and membership in the Society are the prizes.

A total of $1000 will be awarded by Ferro Corporation in their third student contest in porcelain enameling. Prizes will be awarded to both graduate and undergraduate students in ceramic engineering schools in the United States.

Judges for the Ferro contest are Edward Mackasek, managing director, Porcelain Enamel Institute; Charles S. Pearce, ACS general secretary; and B. J. Sweo, director of ceramic research, Ferro.

Mrs. D. Owen Evans is general chairman of Women's activities. Assisted by ten chairmen and their committees, she has arranged for a program consisting of plant trips, teas, tours, style show, TV program, and

finishfoto

Officers of the Enamel Division for 1951-52, left to right: E. E. Marbaker, vice chairman; E. E. Howe, chairman; Wayne Deringer, secretary; and G. H. Spencer-Strong, trustee.

places to eat and visit in and around Pittsburgh for the women attending the convention.

Committee chairmen and their assignments include: Mrs. Theodore Lenchner, brunch and style show; Mrs. Edward E. Marbaker, hotel tours; Mrs. L. Roger Burke, prizes; Mrs. Earl Frazier, card party; Mrs. Robert W. Limes, sightseeing tours; Mrs. J. S. Nordyke, transportation and Heinz trip; Mrs. Robert R. Robinson, headquarters; Mrs. Andrew C. Wagner, television show; Mrs. Ralph L. Weaton, publicity; and Mrs. George G. Weddell, photographs. Each of the chairmen has her own committee.

140 technical papers

More than 140 technical papers have been scheduled for presentation in the sessions of the eight ACS divisions. These have been arranged by the various Division program chairmen.

The Enamel Division program chairman is E. E. Marbaker, of Mellon Institute, who is also vice chairman of the Division. Other Enamel Division officers are G. H. Spencer-Strong, Pemco Corporation, trustee; E. E. Howe, Chicago Vitreous Enamel Product Co., chairman; and W. A. Deringer, A. O. Smith Corp., secretary.

Enamelers to hear varied program

Seventeen papers will be presented in the five sessions of the Enamel Division, American Ceramic Society.

Papers on **adherence** will be presented by R. F Patrick, E. G. Porst and G. H. Spencer-Strong, of Pemco Corporation, Baltimore, Md.; by J. C. Richmond, D. G. Moore, H. B. Kirkpatrick, W. N. Harrison and J. W. Pitts, of the National Bureau of Standards, Washington, D. C.; and by J. F. Uher and B. J. Sweo, of Ferro Corporation, Cleveland, Ohio.

A study of the **resistance** of enamels **to alkaline solutions** will be presented by H. R. Toler and J. T. Roberts, of The Crane Company, Chicago, Ill. H. S. Saunders of The O. Hommel Company, Pittsburgh, Pa., will present an improved method for determining alkali resistance.

The **split-ring test** will be discussed by J. D. Walton Jr., and B. J. Sweo, of Ferro Corporation, Cleveland, Ohio. J. R. Crandall, J. C. Richmond, A. G. Eubanks and W. N. Harrison, of the National Bureau of Standards, Washington, D. C., will present material on **bending tests** on thin enamels and the correlation of service data with laboratory tests. The application of the fluorescent **X-ray spectrometer** to enamel investigations will be discussed by R. F. Patrick, of Pemco Corporation, Baltimore, Md.

A paper on **gas evolution during enamel firing** will be presented by D. G. Moore and M. A. Mason, of the National Bureau of Standards.

A study of the effect of **furnace atmospheres using induction firing** will be presented by W. J. Plankenhorn and A. I. Andrews, University of Illinois, Urbana, Ill., and the **effect of carbon on the enameling of steels** will be discussed by G. P. K. Chu, M. L. Hill and H. M. Davis, from the Pennsylvania State College, State College, Pa.

Titania-opacified enamels will be discussed by S. S. Cole, Titanium Alloy Mfg. Division, National Lead Co., South Amboy, N. J., and by D. C. Bowman and A. V. Sharon, Chicago Vitreous Enamel Product Co., Cicero, Ill. An investigation of the use of **antimony oxide for opacifying** enamels and glasses will be presented by A. E. Pavlish and L. S. O'Bannon, Battelle Memorial Institute, Columbus, Ohio.

The use of **porcelain enamel art in present-day architecture** will be discussed by Edward Winter, of Cleveland, Ohio, who will use color slides to illustrate his talk.

A general symposium sponsored by the Materials and Equipment Division on the availability of materials may prove of interest to enamelers. This symposium will feature a **lead survey** for the ceramic industry by Robert Ziegfeld from the Lead Industries Assn., New York, N. Y., and a discussion on **government regulations on critical materials** by a representative of the National Production Authority.

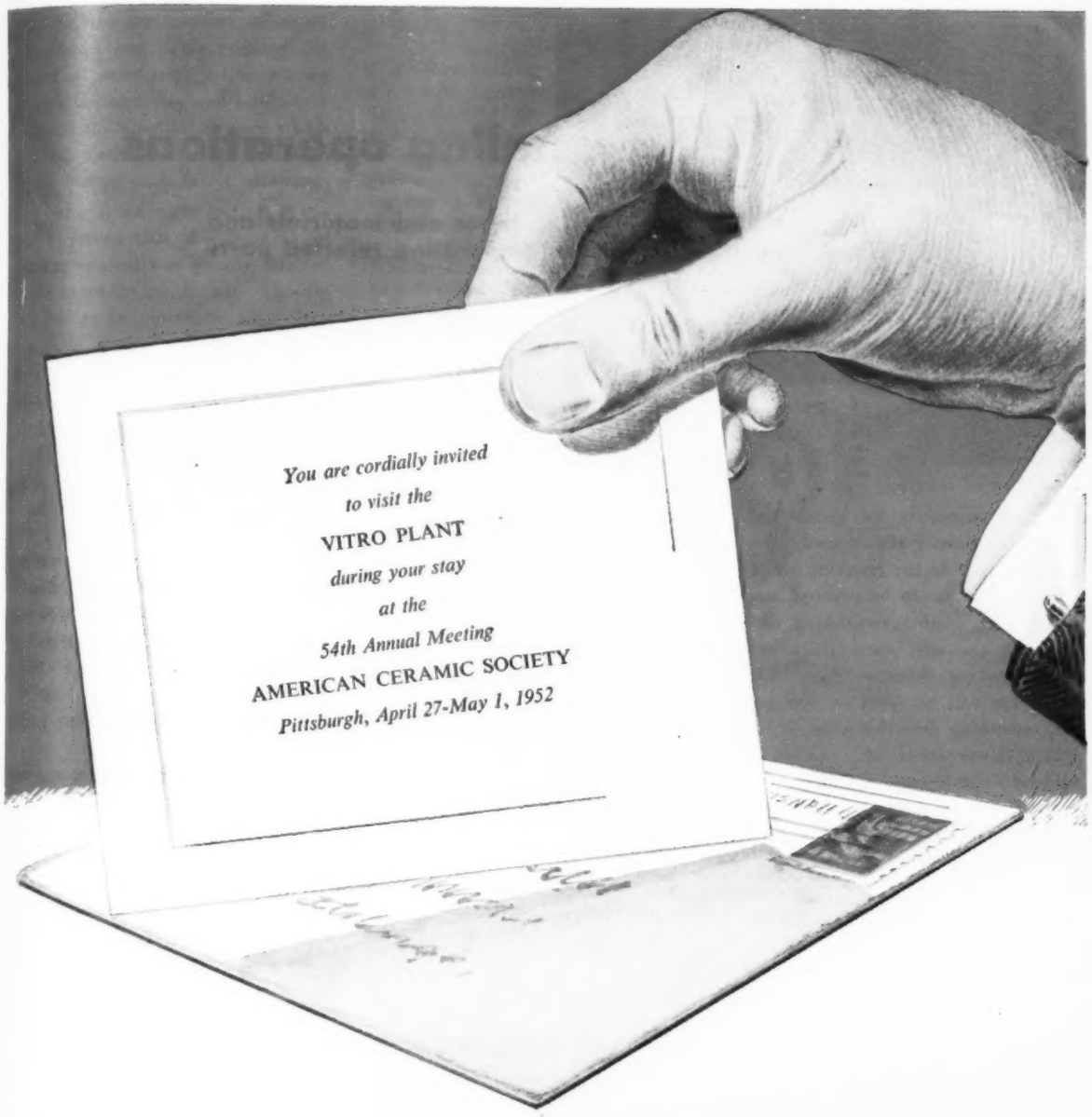
Editor's Note:

Finish **has formerly made a practice of presenting a complete detailed program for the ACS Enamel Division, showing subjects, paper titles, authors, scheduled time of presentation, and authors' abstracts.**

Our service to *finish* readers and the Society in this connection was to spread the program information to as many interested readers as possible *in advance* of the annual meeting.

American Ceramic Society policy no longer permits the release of this information to the industry's trade publications. We therefore regret that it is not possible to continue this service.

Information released in advance of our closing date is included in this pre-convention article.



All of us at Vitro are looking forward to seeing you at the 54th Annual Meeting of the American Ceramic Society. While you're in Pittsburgh, we hope you'll accept our invitation to make a tour of our plant. You can be sure we'll be glad to have you.

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Conservation in enameling operations

suggestions for conserving labor and materials and practical information on re-operating rejected parts

by Evan Oliver • CERAMIC ENGINEER, SERVEL, INC., EVANSVILLE, INDIANA

CONSERVATION of materials and labor has always attracted the attention of enamelers from the standpoint of reducing costs.

Military demands for metals and other materials make conservation necessary due to the resulting shortages. The phases to be covered here are: storing, milling, reclaiming, dipping and slushing, spraying, firing, and reworking defective ware. The most time will be spent on the last one, reworking defective ware, in the light of developments at Servel which reduced scrap losses, from all causes, to about one per cent.

The shop man has labor and defense problems to occupy his time along with enameling problems. Therefore, this outline goes into some detail to help the busy foreman use any part that is suited to his problems. It is the result of many years' development in shop operation and covers most operations.

Storage

As though we were taking a progressive tour of the plant following the materials to the finished product, let us start in the storage room. Frit and other materials are obtained on daily order by pallet carried by fork trucks. Accidents to paper containers are inevitable. At today's frit prices, a shovelful of frit scattered on the floor results in a dollar's worth of material going into the scrap barrel. Broken bags in frit storage quickly produce losses of 100 dollars or more.

Milling

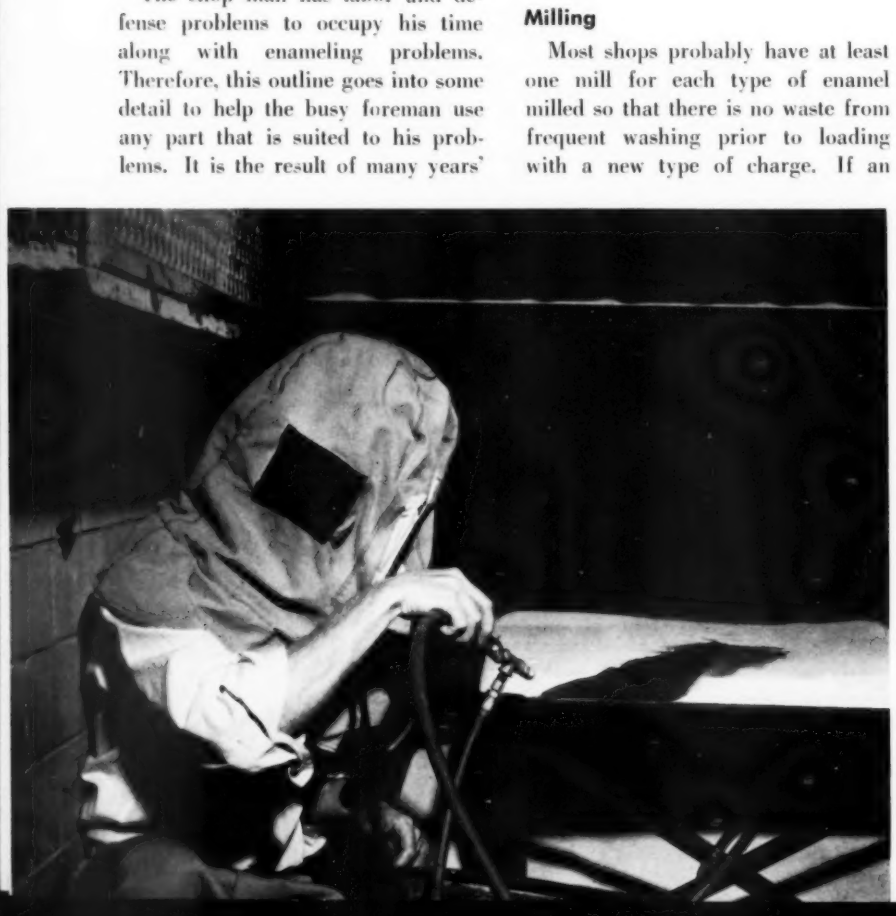
Most shops probably have at least one mill for each type of enamel milled so that there is no waste from frequent washing prior to loading with a new type of charge. If an operator finds that alternate charging of two enamels is necessary in his shop, it would be well to ascertain the amount of the milled enamel lost and compare its value to the interest on investment in an additional mill.

In our milling of ground coat and finish enamels, we have found that the use of high density balls reduces milling time 40 per cent. In ten months the number of revolutions per milling hasn't varied by as much as 100, and no balls have been added during that time.

Shops in an area where the salt content in their water supply is high or varies from winter to summer will find that the use of deionized water will produce much more uniform set in ground coat and finish enamels. Using it in loading mills and adjusting specific gravity will result in all the economies which go along with uniform set, such as: conserving enamel and obtaining a lower number of rejects.

Dipping and slushing

In the next phase, dipping and slushing, losses of enameling materials can be held very low with the use of adequate equipment. Enamel kept off the floor through the use of splash panels and long drainboards (in the case of conveyorized dipping) is as valuable as fresh enamel. For the particular types of ware being processed, the dip tank should be of minimum size and shaped to hold the least enamel consistent with efficient dipping. Holding the enamel volume



1. Sandblast operator uses shoulder level hood and respirator. The room has exhaust fan and air-inlet grid.

down reduces the amount of aging that takes place. This reduces the amount of salts required to set up the tank the next day and holds to a minimum the amount of ware which must be washed off and re-dipped due to lumps and faulty draining.

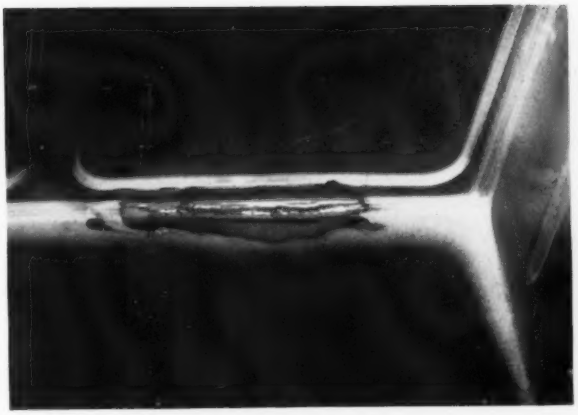
In our holloware production, it has been observed that the draining of titanium enamel was greatly affected by the humidity of the air. The dip tank had to be moved on some days to a point along the conveyor closer to the spongers and beaders. Furthermore, on those same days the enamel sets up sooner on the pans from more rapid loss of moisture. More enamel than necessary stayed on the pan. Conversely, on some especially humid days the enamel drained too long. The result was that the first pans produced had to be re-dipped. (The pickup on the panel used for setting-up the enamel didn't duplicate the draining on the conveyor.)

In order to anticipate the effect of the air on draining, a sling psychrometer of the type used by the Weather Bureau was purchased to measure the relative humidity before setting up the dip tank. A saving of approximately 10 per cent was estimated in enamel consumption.

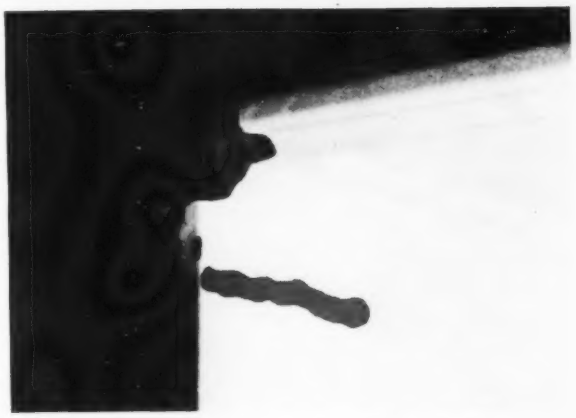
A sump can be used to collect frit particles from washed off ware and equipment in the case of ground coat. A tank of water or sump with the top above floor level to keep out dirt can be used for washing off finish enamels.

Spraying

The spraying phase is a fertile field for conservation. We have heard much concerning the savings resulting from reduced atomization pressures. The pressure at the reducer in our plant is 60 lbs. per sq. in. We haven't measured it at the gun, but it is undoubtedly somewhat lower. In reducing the atomization pressure from 90 lbs. to 75 lbs., we experienced a sharp reduction in the amount of enamel collected in the spray booths. Then, when the pressure was reduced from 75 lbs. to 60 lbs., we kept track of the amount of enamel collected from the spray booth collection system and found it

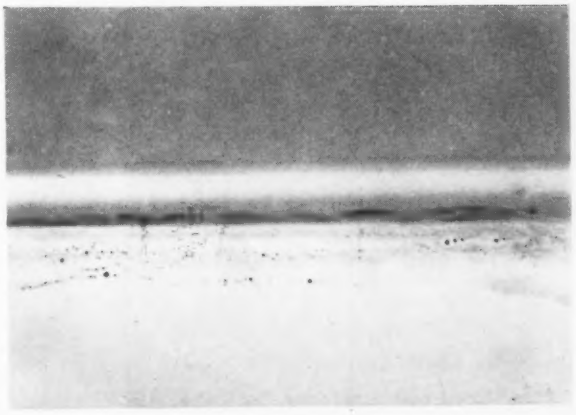


2. After re-welding a ground-coated liner showing an open weld, the area is ground with a pneumatic grinding tool, with possibly some cleaning and sandblasting. Photo shows the welded and cleaned area ready for repair.



3. When blisters from a seam or pipe seam appear in the finish coat, a strip approximately ½" wide is sandblasted along the row of blisters. Enough metal is removed to provide a good base for re-enameling.

4. If blisters do not cover when reworked with a rubbing stone, the welded area is sandblasted. Zircon enamel is applied as a first coat and fired.



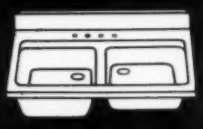
5. When blistering is severe in the zircon on the steel, a second coat of zircon is applied and fired. Then the liner is processed as if it were in ground coat only.

REFRIGERATORS AND FREEZERS

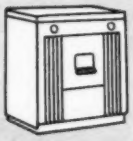
RANGES AND HEATERS

TABLE TOPS FOR KITCHENS AND HOSPITALS

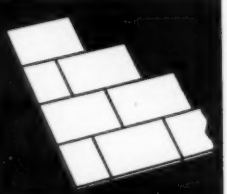
SINKS AND BATHROOM FIXTURES



WASHERS, DRYERS AND IRONERS



ARCHITECTURAL PORCELAIN



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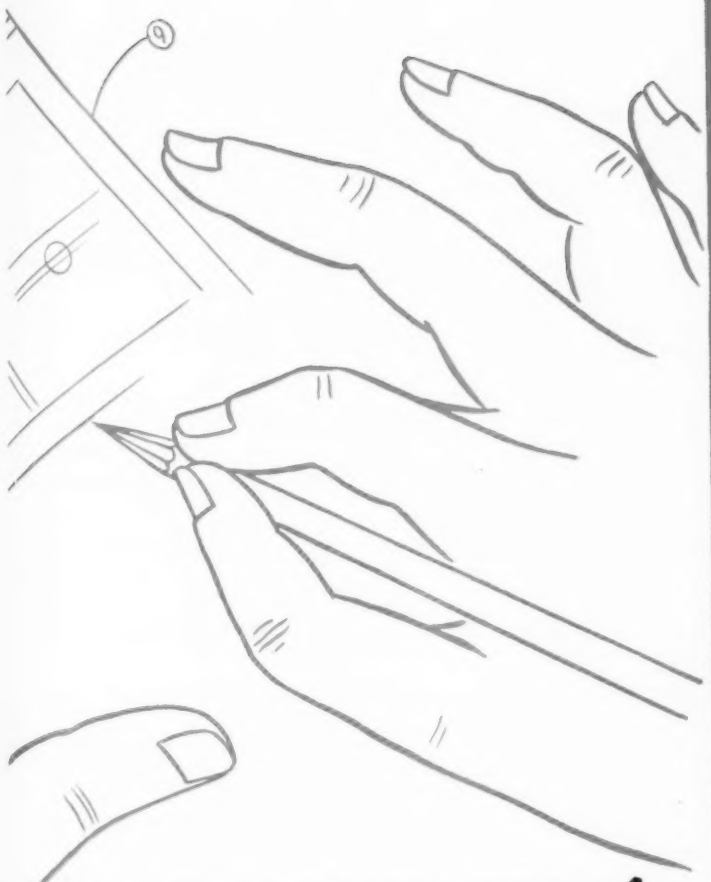

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If you are contemplating a new product, be sure to explore the attractive and economical possibilities of porcelain enamel—for both eye appeal and protection. You are likely to find that porcelain enamel can be used at lower costs than other finishes. Our engineering staff and fully equipped research laboratory are at your service—without obligation, of course.

6 GOOD REASONS FOR USING PORCELFRIT!

1 EXPERIENCE

Since 1901 Ing-Rich has pioneered in porcelain enameling. We have learned a lot in that time—and our customers profit by it.

2 PLANT TESTING

Right in our own porcelain enameling plant, under conditions of actual use, we use PORCELFRIT. When you get it, *it's right!*

3 FEWER REJECTS

Rejects cut your profits and PORCELFRIT cuts rejects to a minimum.

4 SERVICE ENGINEERING

Our service engineers are available to make sure that PORCELFRIT works right for your product . . . you take no chances.

5 LABORATORY CONTROL

Our ceramic engineers maintain constant contact with the production staff to make sure of highest quality.

6 IMPROVED SMELTING

Ing-Rich uses unquestionably the world's finest smelting method, the result of exhaustive research and experiment.

to be 33 1/3 per cent less at the lower pressure.

The use of a thickness gauge along with close supervision will make a minimum application possible. The minimum satisfactory thickness can be determined by measuring the thickness where the white enamel coverage is barely satisfactory. Allowance must be made for variations in ground coat coverage, however. In the case of a refrigerator liner, the ground coat is likely to be one mil heavier on the upper side in draining position than it is on the under side.

A few months ago we had a demonstration of how much could be saved by close supervision. Normally, our total thickness on refrigerator liners ran from .006" to .008". Frequent checking of thickness and keeping the individual sprayers informed changed our thickness range from .006" to .008" down to .006" to .007" with the mean thickness near .006". Approximately a 20 per cent reduction in quantity of enamel consumed is the result.

Reclaiming

In the operations of ground and finish coat application we have collected a certain amount of material that is not usable as such. How shall we treat it to recover the high value of its frit content?

Let's start with the ground coat wash-off sump. Our particular method of treatment involves mixing the sump material with clay, etc. in a heavily overloaded mill for about three hours. The overloading, of course, is to obtain mixing without grinding. The mill formula is as follows:

Ground coat reclaim	2000 lbs. approx. dry equivalent in a 1000-lb. mill
Clay	90 lbs. (4½%)
Borax	7½ lbs.
Bentonite	4½ lbs.

After running the enamel through a magnetic separator twice and through a 60-mesh screen a test sample is dipped and fired. Depending on how much reclaim is in storage, up to 1/8th part is added to enamel in the dip tank.

We have some wet and some dry titanium reclaim from the spray booths and some wet from a wash-off tank. It is mixed as follows:

Titanium reclaim	2400 lbs. approx. dry equivalent in a 1000 lb. mill
Clay	10 lbs. (¼%)
Potassium chloride	3 lbs.
Sodium nitrite	1½ lbs.

"SHALL WE LET THE MATTER REST ON YOUR —ER—SHOULDERS, THEN?"

After running the enamel through a magnetic separator and screen twice, a sample is made and fired. Then, depending on the amount of reclaim on hand and on how clean the sample was, up to 1/4th part is added to spraying enamel. Visible specks are extremely few and not a cause for liner rejection. Perhaps an item which is subject to rigid inspection, such as a stove top, could not be sprayed with enamel containing reclaim.

Firing

It is quite evident that most enamelers have been making improvements in firing. Reduction of firing temperatures effects the greatest saving of any operation in the shop by permitting the use of lighter gauges of enameling iron and steel. Furthermore, only through the use of lower firing temperatures in the post-war period has it been possible to expand the production of enameled appliances and other items. Enough enameling iron, even in lighter gauges, simply could not have been secured. The frit producers have done a great job in meeting the problem even without mentioning the fact that the cover enamels are vastly superior in performance.

In each individual case it is important to fire at the lowest possible temperature. For in many cases, such as refrigerator liners, the amount of reworking is limited by the amount of warpage during firing. By reducing the gauge of metal used in a liner by one, the cost reduction in metal amounts to about 30¢. We would have to scratch a long time in the enameling department to effect a fraction of that amount of saving.

Lower firing temperatures increase the life of furnace materials. Maintenance costs are reduced, but also, very scarce metals are conserved in the case of radiant tube type. We are starting our third year on the tubes in the furnace that we have used continuously and have replaced only one section of radiant tubing.

Firing at lower temperatures reduces radiation and drag-out losses, and, consequently, gas consumption.

to Page 68 →

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(32 Nickel—21 Chromium)

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Right now, Incoloy, like other Inco Nickel products, is on extended delivery because of defense needs. So it will pay you to place your order well in advance of anticipated production—be sure to include the necessary NPA rating with full end use information.

And remember, Inco's High-Temperature Engineering Section is ready to help you with your high-temperature problems. Write today for the specially designed High-Temperature Work Sheet to help outline your requirements.

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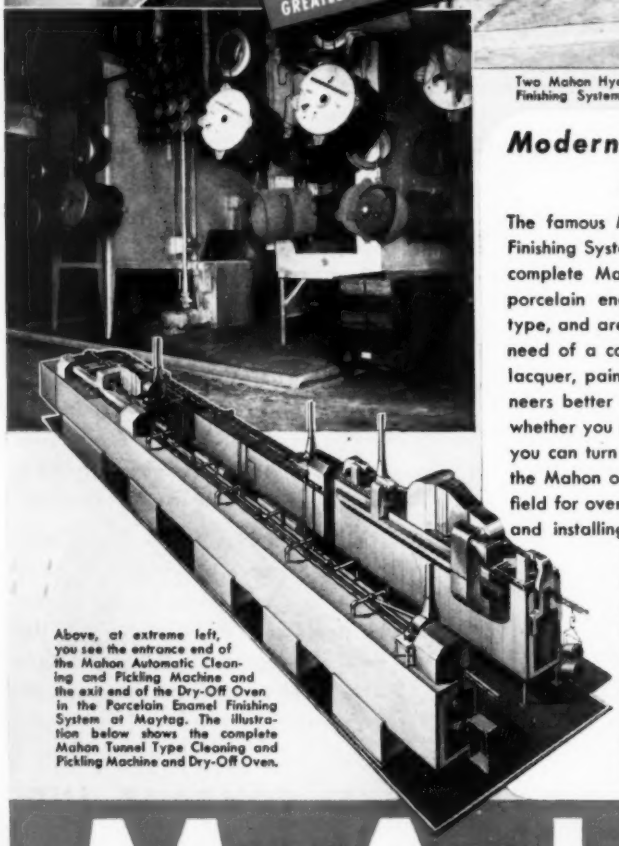
COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

Two Mahon Hydro-Filter Spray Booths in the air conditioned spray room of the Synthetic Enamel Finishing System at Maytag. Note Diffusers of the Filtered Air Supply System in the ceiling.



Above, at extreme left, you see the entrance end of the Mahon Automatic Cleaning and Pickling Machine and the exit end of the Dry-Off Oven in the Porcelain Enamel Finishing System at Maytag. The illustration below shows the complete Mahon Tunnel Type Cleaning and Pickling Machine and Dry-Off Oven.

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MAHON

Symposium on recent advances in industrial finishes

short course in fundamentals of "paint as an engineering material" held at the Case Institute of Technology

(illustrated exclusively with finishfotos)

A REPORT BY *Matt E. Heuertz* • ASSOCIATE EDITOR

THE Case Institute of Technology, Cleveland, Ohio, held its first industrial finishes symposium, February 27, 28 and 29.

The symposium on "Recent Advances in Industrial Finishes" was sponsored by the Organic Coatings Research Department of the Case Department of Chemistry and Chemical Engineering, in cooperation with the Cleveland Paint, Varnish & Lacquer Association.

Specifically, the three-day seminar was devoted (1) to a review of progress in specific aspects of finishing technology, and (2) to focus attention on, and stimulate interest in, the study of finishing problems where the lag in development has limited the more extensive use of better industrial finishes and application methods.

Dr. W. von Fischer, head of the Case Department of Chemistry and Chemical Engineering, opened the meeting Wednesday morning, February 27, with a short address of welcome, following which he discussed "Synthetic Resin Finishes for Improved Corrosion Resistance."

Dr. E. G. Bobalek, also of Case, then conducted a question-and-answer session, with questions based on Dr. von Fischer's talk.

Wednesday afternoon, E. C. Botti, of the pigments department, E. I. du-Pont de Nemours & Co., presented an illustrated talk on "New Aspects of Color Design." Through the use of an elaborate array of carefully prepared color samples, Botti explained how it is possible to achieve scores of different colors with only a few basic pigments.

Preparation of metal surfaces

Thursday morning's session was

The photos on this page show some of the men in attendance at a symposium session.

At guest speakers table at banquet: H. A. Barbian, Dow Chemical; Dana Chase, finish; *Wm. von Fischer, Case Institute; D. M. Gans and E. C. Eberman, American-Marietta.*

devoted to a panel on "Preparation of Metal Surfaces for Painting." Speakers included R. C. Gibson, of Parker Rust Proof Company, discussing the preparation of *steel;* R. I. Wray, of Aluminum Company of America, on *aluminum* preparations; and H. A. Barbian, of The Dow Chemical Company, on *magnesium* preparation.

Spray application of paint

Thursday afternoon was given over to a panel on "Spray Application of Paint." Speakers included L. W. Lammiman, technical service manager, The DeVilbiss Company, on "Factors Involving Economical Spray Application"; R. L. Huber, of Hercules Powder Company, on "Today's Opportunities for Nitrocellulose Lacquer"; and D. E. Creps, representing Ransburg Electro-Coating Corp., on "Electrostatic Spraying Processes".

Creps presentation consisted of two color movies showing the practical plant applications of both Ransburg's No. 1 and 2 processes. A number of interesting case histories presented were in the plants of home appliance manufacturers.

Why paint specifications?

At a banquet held Thursday evening at the Wade Park Manor, C. F. Pickett, chief, Paint and Chemical Laboratory, Aberdeen Proving Ground, presented an address entitled "Why Paint Specifications?".

Editor's Note:

William von Fischer, head, Department of Chemistry and Chemical Engineering, Case Institute of Technology, has developed an unusually interesting and comprehensive paper presenting a complete story of developments relating to the use of "Synthetic Resins for Industrial Finishes."

Both plant men and executives of companies producing fabricated metal products are familiar to some extent with developments in the use of synthetic resins. The majority of the finishing departments of production plants will have used one or more of the many types of finishes employing synthetic resin technology.

It is, therefore, with pleasure that *finish* announces the publication of the von Fischer work in a three-part feature to start with the May issue.

Pickett pointed out that both buyer and seller benefit from rigid specifications. In referring to performance, the speaker said "There are the usual tests of color, speed of drying, hardness, viscosity, opacity, adhesion, package stability, settling, water immersion, gasoline immersion, salt fog box tests, accelerated weathering, etc. All of these are of much value in quality control of a given type of product. However, in the final analysis *the real test is the performance of the paint in actual use.*"

In concluding his remarks, Pickett said "A specification should be a carefully written document which will completely describe or particularize a set of conditions that will insure the procurement of an acceptable quality item and reject those of unsatisfactory quality. Furthermore only conditions which can be resolved should be used, omitting any areas of conflict or disagreement, hence the basis of mutually satisfactory business dealings.

"Stringent specifications protect the buyer with reference to quality and the seller to fair and equitable conditions."

Laboratory testing

Friday morning, Francis Scofield, of the National Paint, Varnish and

Also at guest speakers table were: R. C. Gibson, Parker Rust Proof; G. T. Sohl, Rohm & Haas; C. F. Pickett (guest speaker), Aberdeen Proving Ground; E. L. Brazet, American-Marietta; E. G. Bobalek, Case Institute of Technology.

Members of spray painting panel, left to right: L. W. Lammiman, DeVilbiss; R. L. Huber, Hercules Powder; and D. E. Creps, Ransburg representative.

Lacquer Association, discussed "Laboratory Testing for the Prediction of Service Properties of Coatings."

The closing discussion, Friday afternoon, on "Writing of Specifications for Coatings", was conducted by Dr. E. G. Bobalek, of the Case Institute of Technology.

C. F. Pickett, Aberdeen Proving Ground, guest speaker at banquet.

Francis Scofield, of National Paint Varnish & Lacquer Assn., discussed laboratory testing.

E. C. Botti, of duPont, discussed new aspects of color design.

Condensations of Symposium Papers

Preparation of steel surfaces for painting

by R. C. Gibson

The useful life of any paint finish depends upon the durability of the paint and its adherence to the surface on which it is applied. Both the physical and chemical properties of a steel surface have considerable bearing upon the adhesion of the paint film. It is now recognized that the life of a paint system depends upon both cleaning and chemical treatment of the steel surface prior to application of the paint finish. Thorough cleaning of the steel surface to remove foreign material followed by a chemical coating treatment are prerequisites to obtaining satisfactory paint performance.

Cleaning of steel surfaces

Most steel surfaces are contaminated with soil. Soil may be considered as undesirable material which is formed or used on the surface during the normal production operations. The soil may be oil, grease, wax, shop dirt, soldering and welding fluxes, abrasives, drawing compounds, rust, scale, active salts, etc. Oily materials will prevent adhesion between the metal and the paint.

Members of metal preparation panel, left to right: H. A. Barbian, Dow Chemical; R. I. Wray, Aluminum Company of America; R. C. Gibson, Parker Rust Proof.

G. H. Mattie, DuPont.

R. W. Body, Body Bros.; E. J. Hakel, General Elec.; Thos. Goss, Patterson-Sargent.

Nick Sandru, Union Me

Rust and corrosion products will continue to form under a paint film. The paint film is porous to moisture penetration which causes continued corrosive action. Then the corrosion products cause breaks in the paint. This is a slow reaction and may not become apparent for some time. In general all foreign material should be removed from the metal before it is painted.

The choice of a cleaner will be affected by the steel concerned, the kind of soil present, ease of removability of soil, and the completeness of the cleaning job required. Some of the cleaning methods commonly used in industry are as follows:

Organic solvent cleaning
Alkali cleaning
Emulsion cleaning
Pickling
Mechanical cleaning

Chemical coatings

The cleaning methods just mentioned, although necessary to produce a clean surface, do not provide for inhibiting corrosion or materially increasing the adhesion of applied paint films.

A steel surface corrodes by reacting with the moist environment to which it is exposed. The electrochemical theory of corrosion postulates that a metallic surface is not homogeneous due to differences in chemical composition and physical strain. The results of much experimental work have shown the existence on the surface of anodic areas, where metal ions pass into solution, and cathodic areas, where hydrogen ions go out of solution as hydrogen gas or combine with oxygen to form hydroxyl ion. Thus, the presence of these local cells provides the corrosion mechanism of the metal in contact with its environment.

The chemical coating treatment may be regarded as controlled corrosion. It has as its main objective the formation of a stable, non-reactive coating chemically combined with the base metal which by reducing the activity of the metal retards corrosion and provides greater adhesion of applied paint finishes.

The phosphate, chromate and certain oxide coatings are examples of protective coatings now being used in industry.

Phosphate coating

The phosphate coating treatment is one of the most successful treatments used for preparation of steel, prior to painting. When a cleaned steel surface is treated with an aqueous solution consisting of a metal phosphate of zinc, iron or manganese, accelerating agents and free phosphoric acid, it is converted into a crystalline coating of secondary and tertiary phosphates, adherent to and integral with the base metal.

Recent concepts of phosphate coating formation in accordance with the electrochemical theory of chemical attack, postulate (1) that metal enters into solution at the anodic areas according to the following equation (when the metal is iron), $Fe^{\circ} = Fe^{++} + 2e$, and (2) that the following reactions occur at the cathode areas:

$$2H^{+} + 2e = H_2$$
$$O_2 + 2H_2O + 4e = 4\ OH^{-}$$

The decrease of the hydrogen ion concentration in the solution layer next to the cathodic areas of the metallic surfaces causes precipitation of the insoluble secondary and tertiary metal phosphates at these areas, due to the shift to the right of the equilibrium of the following reactions:

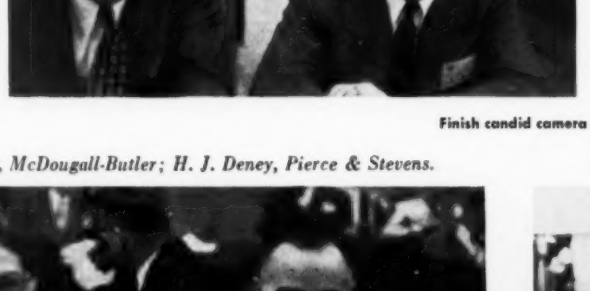
$$Me(H_2PO_4)_2 \rightleftharpoons MeHPO_4 + H_3PO_4$$
$$3MeHPO_4 \rightleftharpoons Me_3(PO_4)_2 + H_3PO_4$$

The rating of coating formation is influenced by the rate at which metal dissolves. Both oxidizing agents and certain heavy metal ions such as Cu^{++}, are used in the phosphating solution to speed up the coating formation. The oxidizing agent depolarizes at the cathodes by removing hydrogen. This reduces the hydrogen gassing and increases the anodic reaction both of which cause rapid coating formation.

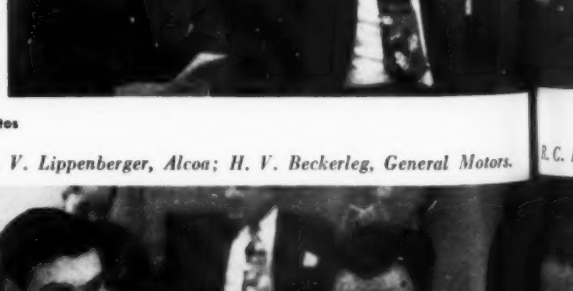
Metals such as copper which are cathodic to the dissolving iron increase the rate of dissolution of iron by depositing on the iron and forming local cells with it. Thus, a large number of centers for crystal growth are produced which result in rapid formation of phosphate coating.

When zinc or manganese phosphate solutions are used to coat steel, the

Frank Trem and Arnold Frey, Cadillac Tank Plant.



H. J. L. Cotton, Sherwin-Williams; D. G. Ubersax, Burke Su



Finish candid camera photos

M. E. Schleicher, McDougall-Butler; H. J. Deney, Pierce & Stevens.

D. V. Lippenberger, Alcoa; H. V. Beckerleg, General Motors.

Kozacik, Cincinnati Chemical.

C. E. Pope, F. E. Diehl and E. F. Teyber, Lowe Bros.

Karl Groves, Apex Electrical.

phosphate coating is a mixture of zinc or manganese phosphate with iron phosphate formed from the dissolving iron.

A new one-coat pigmented metal conditioner offers structural steel and custom fabrication fields the advantages of a phosphate coating surface treatment. It is a single coat material which may be used by brush, spray or dip prior to application of paint finish systems. Its field of use includes tanks, truck bodies, structural steel such as bridges, derricks and girders, and in automotive repaint shops.

Preparation of magnesium surfaces for painting

by H. A. BARBIAN

As with other metals, magnesium is painted for corrosion protection and for sales appeal. In general, the painting techniques are similar to those used on other metals. In one respect, however, magnesium differs from some other metals in that it requires protection against galvanic corrosion. Because of its high potential, magnesium is corroded sacrificially while protecting the steel, aluminum, or other metal it is coupled to. Insulation of this joint is often required, and paints can play an important role in supplying this insulating barrier.

As in the finishing of any other metal or material, it is necessary to have a good clean surface on magnesium before the application of any chemical treatment or paint. Conventional solvent and solvent emulsion cleaners are used for the removal of large amounts of foreign material and heavy duty alkaline cleaners designed for use on steel, with a pH of 11 or higher, are used for cleaning magnesium.

After cleaning, it is sometimes desirable to give the magnesium some type of acid pickle in order to remove drawing lubricants, corrosion product, contamination, etc. Two acids, hydrofluoric and chromic, are used quite commonly in the magnesium finishing industry because they do not attack magnesium. These acids alone or in combination are found in most of the pickles and chemical treatments used on magnesium. Hydrofluoric acid forms insoluble magnesium fluoride film on the surface of the metal but, at the same time, dissolves metallic impurities embedded in the surface, and, hence, essentially cleans the magnesium surface. Chromic acid dissolves magnesium oxide, and, hence, is used in any pickle or treatment which is designed to remove corrosion product from the magnesium surface without the removal of any metal. By this same process it removes other types of contamination. When metal loss can be tolerated, any of the conventional inorganic acids can be used, but nitric acid or mixtures of acids containing the nitrate radical, are often desired because of the lesser tendency for smut to form on the surface.

A variety of chemical treatments are available for use on magnesium. There are proprietary treatments which are used primarily as paint base treatments; others which will give black coatings where desired; treatments which will give bright metallic finishes; and treatments which will give anodic coatings. Of these, the chrome pickle treatment is used most widely commercially as a paint base treatment, and the dichromate treatment is used most widely as a paint base treatment on military parts. The latter treatment is more protective in severe exposures than the former treatment. Almost all of these chemical treatments consist of a chromate film deposited under a variety of conditions. Protection is obtained by inhibition of a corroding medium by the chromate ion leached from the coating and paint adhesion is obtained either by a mechanical etch, as in the chrome pickle, or by absorp-

to Page 50 →

H. L. Cahn and J. J. McDonough, U. S. Stoneware.

T. J. Schrimser and Dave Hodowanetz, Westinghouse.

Finish candid camera photos

R. C. Krueger and M. Malaga, Arco; C. H. Leopold, Ferbert Schorndorfer.

J. D. MacQueen and W. A. Stadtler, I. B. M.

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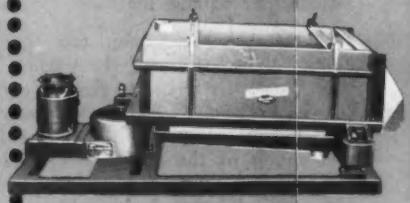
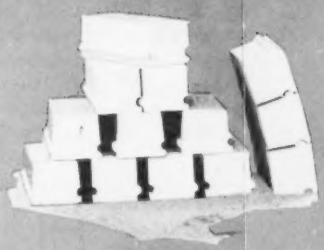
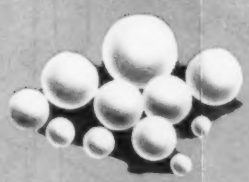
POROX LINED STORAGE MIXERS FOR GLAZE AND VITREOUS ENAMEL



GYRO-CENTRIC SCREENS FOR CLAY, GLAZE AND ENAMEL



POROX LINING BLOCKS FOR MILLS



POROX AND ARLCITE (HIGH DENSITY) GRINDING BALLS

PRESSURE VESSELS FOR SPRAYING VITREOUS ENAMEL, GLAZE AND OTHER COATINGS

A "push-button" plant

drawing of new fabrica set-up
automatic water heate nt in K

FINISH presents a striking example of an automatic push-button fabrication plant for the production of a typical home appliance — automatic hot water heaters.

The production problem

A chief bottleneck has been in the fabrication of the inner tank of the heater. Flat steel is rolled into a cylinder, then the edges are joined by an automatic flash weld. The weld is trimmed. Each end of the cylinder is flared so that the heads of the tank will fit. Then the cylinder is given a hydrostatic pressure test at 300 pounds per square inch.

There also has been too much "down time." Part of the reason is the time that it takes to change over the equipment from one diameter tank to another. Another reason is that much of the equipment is old and requires excessive maintenance. For example, the flash welder saw many years of service at the company's Milwaukee plant before it was installed five years ago in the new Kankakee Works.

In studying the problem of replacing this equipment, the engineering staff discovered that at little or no additional investment — beyond what was needed for straight replacement— the efficiency of the operation could be vastly improved. The bottleneck could be broken and costs reduced substantially.

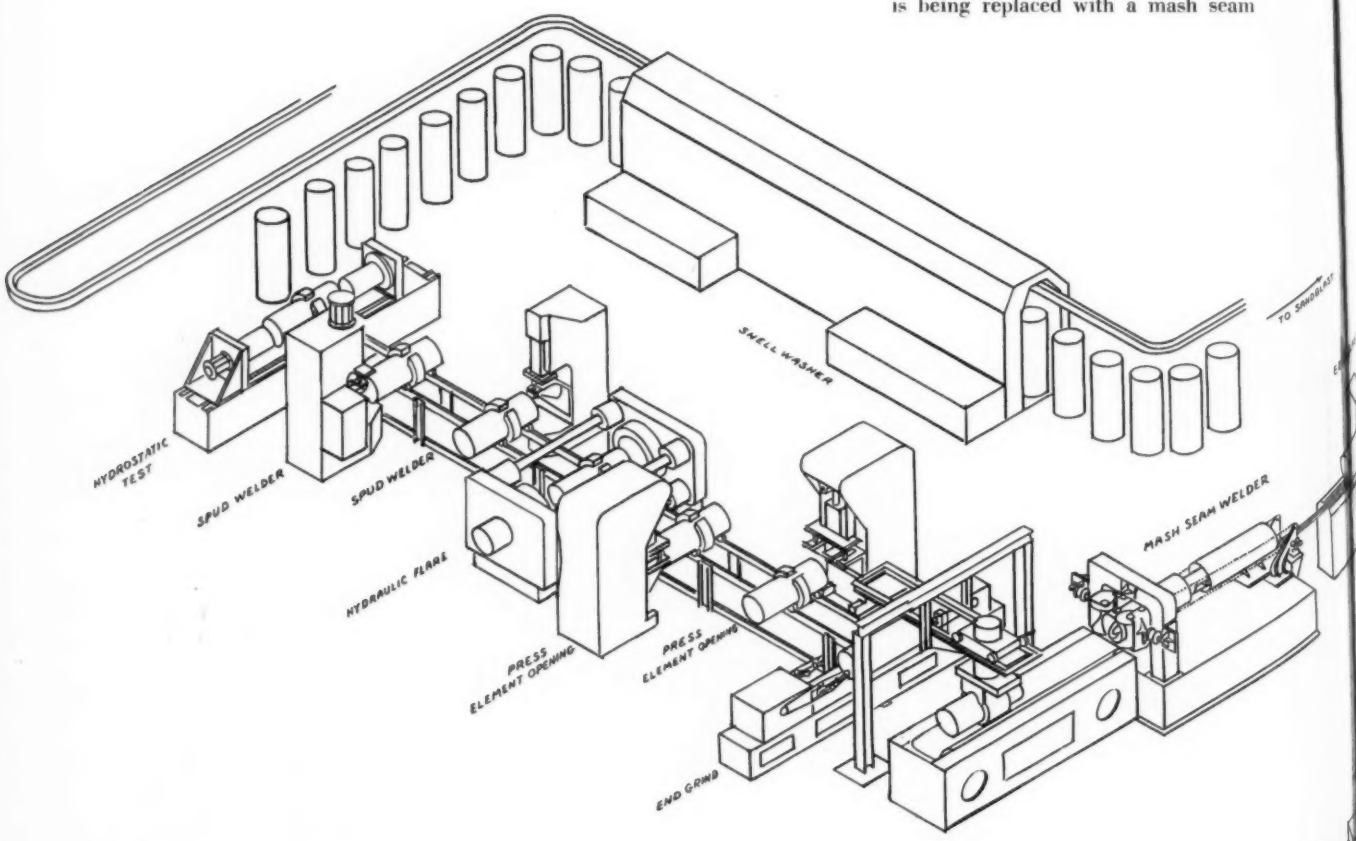
This is being accomplished in four principal moves:

Improved steel cleaning method

The flat sheets of steel will first go through a cleaning operation, in which steel grit will be thrown against the sheet steel to remove mill scale. This problem was met by having the steel mills pickle the steel, and oil it before shipment. The grit blasting will be much cheaper. When it is realized that the company now uses better than 2500 tons of steel per month, and will be using a lot more under an accelerated program, it can be seen that this operation alone will save thousands of dollars every month.

New type welding machine

The present flash welding machine is being replaced with a mash seam



t for automatic fabrication

...ricati... set-up at A. O. Smith's ...ater plant in Kankakee, Illinois

welder. Under the new operation, the two edges of the tank will be automatically lapped one over the other, heated electrically, then mashed together. This will provide a much faster operation.

Faster testing method

Under the present method of testing, both ends of the tank are closed and the tank then filled with from 20 to 80 gallons of water, depending on the size of the tank. This takes time. Equipment is being made now in which the tank will be held in a horizontal position so that mandrils can be inserted from both sides into the tank. The mandrils will be only slightly smaller in diameter than the tank. Thus, only enough water will be needed to fill the small area between the mandrils and the tank. The test, therefore, can be made in much shorter time.

Automatic tank fabrication

For more than 30 years, A. O. Smith Corp. has had extensive experience with manufacturing operations that are automatic, or virtually so. An automatic frame plant, at the Milwaukee Works, has a capacity of better than 10,000 automobile chassis frames per day. In another Milwaukee plant, the company produces nearly 25 miles of large diameter steel pipe daily in an automatic operation that handles more than 75,000 tons of steel a month.

Calling on this experience, A. O. Smith Kankakee engineers designed the whole tank welding operation so that the movement of the tanks from one station to another will be done by mechanical means.

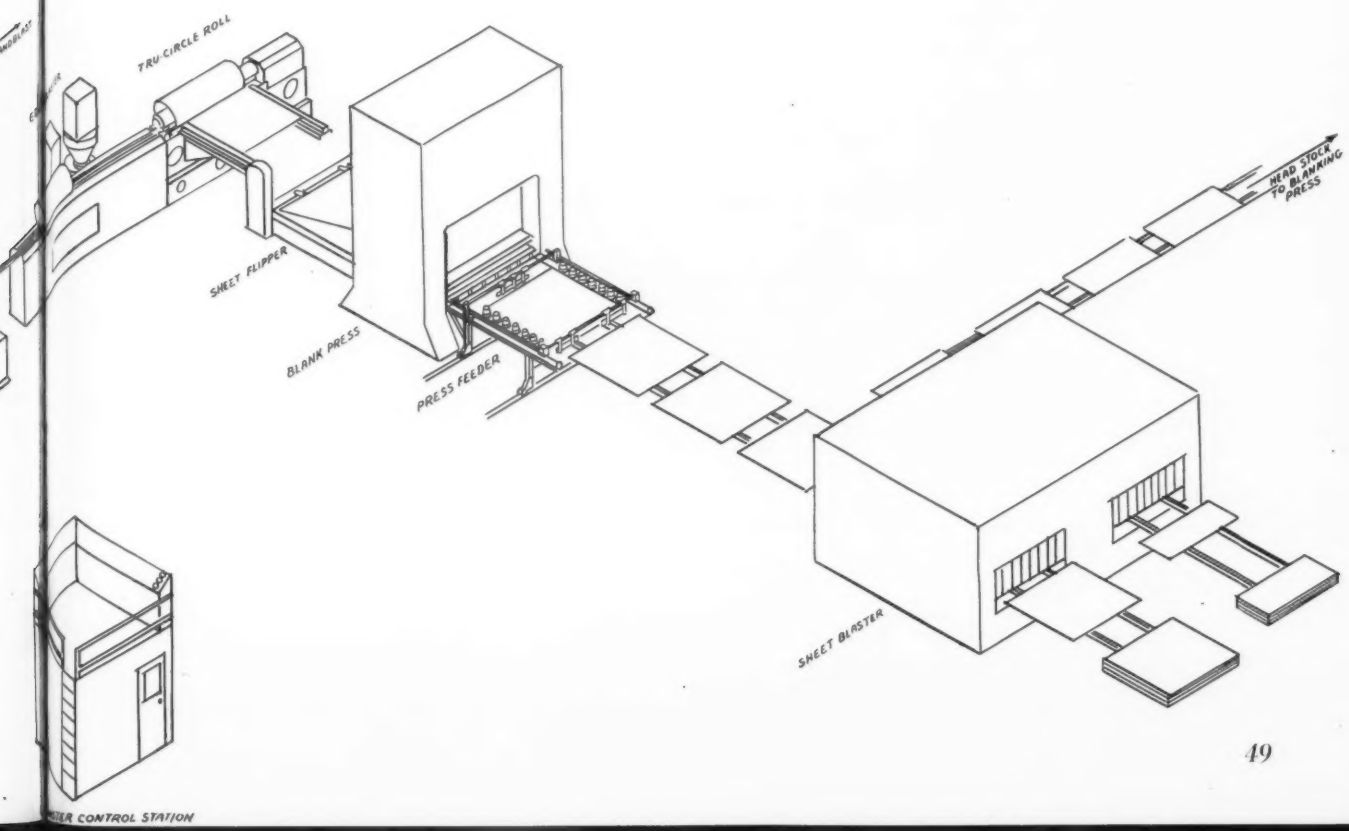
For example, hopper-fed welding machines will weld steel spuds into the tank wall in an entirely automatic operation.

It is to be understood, of course, that the foregoing sets forth only the highlights of the new tank fabrication operation. There are many other technical details. *The net result, however, will be that tanks will come off the end of this line at the rate of four each minute.*

There are three large furnaces at the Kankakee Works in which glass is fused to the tanks, the tank heads and various other parts that need protection. Each unit is equipped with big sandblasters that thoroughly clean the steel parts before glass-coating.

Any sandblasting equipment wears out rapidly. The problem of abrasion is a serious one. The resulting high maintenance means loss of production time in addition to the high cost of such maintenance.

This equipment is being replaced with airless units and substituting steel grit for sand. The initial cost of grit is higher than sand, but it lasts so much longer that it is more economical. The end result achieved by this equipment will be: (a) more productive time, (b) lower maintenance cost, and (c) lower abrasive cost. This is significant when one considers a plant capacity of 600,000 units per year.



→ *from Page 45*

tion into the chemical treatment film, materials. A few new primers adhere well to bare or poorly chemically treated magnesium so there exists the possibility that in the future, chemical treatments may not be required primarily for paint adhesion purposes as in the case of other specific treatments.

Once satisfactory chemical treatments are applied on magnesium parts, they can be painted in a conventional manner with proprietary and hence, would only be desired where their additional corrosion protection is desired. Much interest is being expressed in the finishing of magnesium and we know that improved methods will result.

Today's opportunities for nitrocellulose lacquer

by R. L. HUBER

Lacquer has long been acclaimed as a high-speed finishing material — because of its unequaled speed of dry. But for some kinds of work it has been supplanted by baked-on synthetic enamels, for the good reason that several coats of conventional lacquer were needed to develop adequate film thickness, and manpower costs were excessive. In these cases, the added capital cost and operating expense of necessary baking ovens were justified by savings in manpower.

The advent of the hot-spray process has changed the picture. In this process, the lacquer is thinned by heat rather than by solvent, and, since solids are higher, a far thicker coating is applied per pass. All the traditional advantages of lacquer are retained, a few new ones (such as minimum orange peel and elimination of blushing due to humidity) are added. Most significant, however, is that the number of coats is sharply reduced.

Advantages of hot-spray lacquer

Solids are higher — fewer coats are needed

Solvent consumption sharply reduced

Coverage per gallon is increased

Tendency to sag and run is minimized

Finish has better flow-out, covers imperfections

"Blushing" is eliminated

Toughness and adhesion can be improved

Capacity of the entire finishing plant can be increased up to 50%.

A manufacturer of large trucks stated that with cold lacquer six gallons of unthinned material were used with each nine gallons of thinner, making a fifteen-gallon mix, all of which was used to coat a specific number of units. With hot lacquer, using the same type of unthinned material, they can now coat the same number of units with five gallons of unthinned material plus three gallons of thinner, or a total of eight gallons, and actually use only about six and three-quarters gallons of this eight gallon quantity. They also find that in changing colors they can wash the heater and the hose with thinner that can be used for the next run of the same color, actually creating no waste of materials whatsoever.

An aircraft manufacturer reports the following advantages: Time saving equivalent to 27½ hours in finishing AD-4 airplanes. Booth time cut from 27½ hours to 18½ hours with present crews and equipment. Equivalent of two gallons of lacquer and eight gallons of thinner saved per plane. Hot-spray method, with only one coat, removes hazard of sanding through the first coat of lacquer on rivet heads and skin laps.

The conclusions which led to this company's use of hot-spray lacquer for Navy production, based on thorough tests, were:

1. Required film thickness can be applied by one hot cross coat where two cold cross coats are necessary.
2. Salt spray and weatherometer tests show the hot-sprayed film to be superior.
3. Smoother and glossier appearance.
4. Eliminates sanding between coats.
5. Affords maximum uniform film thickness over rivets and seams, by elimination of scuff sanding, thereby giving better protection in service.
6. Reduces application time 50% with a resultant increase in production.
7. Saves materials by less over-spray and less solvent required.
8. Has better flow-out and decreases tendency to sag, blush, or orange peel.

Looking at past military requirements for lacquer should be helpful in preparing for the future. During World War II, the most important uses were for shells, aircraft, etc.

For the future, we can look for logical prospects for broadened military usage of lacquer, hot and cold, in such fields as: metal and wood furniture, many items of ordnance ammunition and equipment, military aircraft, precoating of cans, and on other Quartermaster items as typewriter cases, helmets, caskets, containers, etc.

Lacquer in multi-color form

In your exposure to the protective coatings industry you have undoubtedly heard many snide remarks concerning barber pole and polka dot paints. In fact, as a youngster at one time or another you may have been exposed to a foolhardy errand to procure such an item.

It is now possible for multiple colors to be applied from a single can through a single spray gun while maintaining their individual color identity. To be more specific, there are two companies now producing a product of this type which is water-dispersed lacquer retaining individual color characteristics because of manufacturing techniques and special chemicals involved. This product now makes it possible to spray a surface with two or more colors simultaneously in a single spray coat, and does not require special spray equipment nor special techniques. The multiple colors exist separately within the finish and do not merge or blend. Upon being sprayed, they create an interlacing color network which is extremely pleasing to the eye.

Condensation by *finish* editors.

Aluminum surface treatments and preparation for painting

by R. I. WRAY

Many treatments used in preparing aluminum for painting are the same or closely parallel to those used in preparing steel. Surface coating of aluminum is facilitated by the fact that a tightly held oxide film is always present. This relatively inert film affords a desirable base for paint. Aluminum is not difficult to paint if its characteristics are understood. One point of difference from steel is that aluminum has no mill scale to consider.

The paint holding characteristics of various aluminum alloys vary so

little that the surface treatment depends more upon the final use of the end product. There are only minor differences in the paint holding qualities of pure aluminum, commercially pure aluminum and the alloys.

Methods for surface treatment include: (1) mechanical, (2) solvent, and (3) chemical or electro-chemical.

Mechanical treatment

Surface roughening ordinarily is not required. Sand blasting is satisfactory for heavier gages.

In blasting silica sand from 40 to 80 mesh is used, employing 85 lb. air pressure, and with blast nozzle held 12 inches from the part. Sand blasting impairs corrosion resistance.

Hand sanding or scratch brushing are also sometimes used.

Solvent methods

Hand painting or hand scrubbing with mineral spirits solvents may be employed.

Dip tanks may also be employed—the disadvantage resulting is the accumulation of greases in the tanks.

Oven cleaning is used and can be set up for automatic or semi-automatic operation.

For oven cleaning, sheared sheets may be roller-coated on both sides with solvent (petroleum hydro-carbon solvent is suitable) to dilute the grease or other surface contaminants. A belt conveyor will then carry the parts through an oven (cycle of 5 min. at 420 - 450° F.) where the diluted contaminants are easily burned off. The complete cycle is from 17 to 24 minutes.

The oven cleaning system can be advantageously applied where sheets are to be cleaned prior to fabrication.

Solvent vapor degreasing is recommended as the most satisfactory of this type of metal treatment. In a 3-step setup, steps 1 and 2 are hot solvent tanks, with step 3 a low solvent content tank with only the vapor being used. Total cleaning cycle is only about 3 minutes with only 20 seconds in solvent vapor tank. This treatment leaves the natural oxide film intact.

Speeds of 50 feet per minute are attainable where coil sheets are to be cleaned and recoiled.

Chemical treatments

Alkaline cleaners with inhibitors (sodium carbonate or tri-sodium phosphate) are used for surface treatment. Parts may be immersed in recommended solution for about 3 minutes, then rinsed and dried.

Caustic soda dip is not recommended due to metal etch.

Alkaline cleaners, followed by acid treatment, are used. When used, the surface should be painted as soon as possible.

Aqueous solutions of phosphoric acid with alcohol and other additions may be used successfully for swabbing large structures such as bridge sections, etc.

If parts show excess oil or grease they should be first pre-cleaned by de-greasing.

Adequate rinsing is important to avoid streaks.

There are a number of proprietary treatments involving 4, 5 and 6 stage processes. One chemical treatment requires a relatively long time in the dip tanks. The process consists of 5 stages: pre-treatment, rinse, coating, rinse, and sealing. The complete cycle requires about 20 minutes at 180 - 200° F. This process employs a 5-10% solution of potassium dichromate which increases the thickness of the normal oxide film or a 5% chromic acid solution which removes the oxide film but leaves another type of surface necessary for some synthetic resins. Phenolic coatings call for chromic acid treatment.

The most widely used treatment for aluminum is the dip or spray method of applying either a phosphate or chromate surface. Pre-cleaning and rinsing are very important, especially with heat treated alloys of aluminum. Heat treatable alloys have a "skin" which must be removed.

Spray treatment is favored as most effective. A 30 to 60 second spray is sufficient in most instances.

It is *most important* that work be scheduled for painting just as soon as possible after cleaning or pre-treatment. Treated parts should always be handled with canvas gloves.

Electrolytic deposition of surface coatings are also used but there are fewer applications than for chemical treatments as undercoatings. They are well adapted to uses where only a part of the surface is to be painted such as in the refrigerator and aircraft fields. The anodic treatment is considered to be a superior one but for most applications chemical treatments are entirely adequate.

Wash primers are really "surface preparations." For some applications they are equivalent to other recommended treatments. There is a vast difference in materials offered as "wash primers" and careful materials testing is therefore recommended.

A *finish* editorial condensation by Dana Chase, editor.

Factors involving economical spray application

by L. W. Lammiman

There are many factors influencing economical spray application. When put into their proper categories, they can be grouped into these four: *equipment, material, operators* and *supervision*. Each of these four is an influencing factor by itself, but to get the full benefit of lowest cost product finishing, they must be considered together and one coordinated with the other.

Equipment is not just a conglomeration of items, but rather a carefully selected, coordinated group to best do the job at hand. Its selection is a factor in the economies we are striving for. From the standpoint of type, size and quality, equipment is highly important. Each item has a function to perform, and must be chosen to achieve the utmost in performance and economy. The essentiality of the correct spray gun equipped with the proper orifice size and air cap, being fed material from the most suitable dispensing method, and air properly cleaned and regulated coming through pipe and hose of a size holding friction losses to a minimum, cannot be stressed too strongly. A spray booth which effectively ventilates the spray area and provides desirable working conditions, as well as holding down maintenance costs, provides for contented operators and bears on economy. Clean replacement air, where required, will aid in holding down rejects due to dirt.

If 40 or more gallons of the same material are sprayed per day, and the operators are so grouped that not more than 2000 feet of piping would be required to form a circuit to and from the point of circulation, then the circulating system of material delivery is to be preferred. Advantages are: (1) no trucking of material, (2) no spillage, (3) cleaner material — less chance of dirt getting into the material, and (4) better control over material — control meaning the mixing of the material and the maintaining of its viscosity and temperature — which results in a more uniform finish and less off-color if component parts are sprayed prior to assembly of product.

Materials are the consumed item and everything which eliminates their waste should be carefully guarded. By using the recommended solvents or reducers in the specified quantity, maintaining temperatures and uniform consistency of viscosity of the spray materials, this factor in the economy program can be controlled.

"Don'ts" in materials control

1. Use of improper thinner or reducer for the material reduction. There is a proper thinner, one of the correct blend, which your supplier will furnish or recommend. Too often, because of economizing a few cents per gallon of thinner, the overall cost picture has risen.
2. Disregard of the material temperature when reduction is made. This is so self-evident that not much need be said about it, except that it commonly occurs and definitely must be guarded against.
3. Failure to check and hold the material at the viscosity for spraying as recommended by the material manufacturer. A few points one way or another does affect the cost picture. If cost control is wanted, then control of the material is a must.

Spray *personnel* selection and training cannot be overemphasized. Their intelligent and proper use of equipment, with guidance in their spray gun motions, will be responsible for economies definitely affecting the overall cost picture.

When installing conveyors and spray booth, it is well to give thought to the positioning of the operator on the line. Whenever possible, *station the operator so that the ware approaches him from his left* (assuming spray operators are right-handed).

Supervision of a scrutinizing and high level is necessary to see that all the other factors are instituted and maintained. It thus becomes the important link which holds the chain together.

The supervisor over spraying operations must see that all spray guns are of the proper type and correctly set up for his type of materials and work. He must maintain control over air and fluid pressures and see that all the other equipment used in spraying operations is properly coordinated and functioning properly and efficiently. His responsibility is to insist at all times on rigid fluid control and to see that it is constantly maintained. He must carry on the training work of his operators and this should never be neglected or even permitted to lag. Experience has taught those carrying on this education that *spray operators learn faster and become more efficient when given off-the-job (off the production line) training*, in addition to the here's-how education. In this type of training, the spray gun operator learns the function of the equipment, what makes it perform, the spray technique that should be employed and why, the ease with which it can be done, and above all permits him to do his own thinking on his problem and how to overcome it. Both methods are essential to assure complete and thorough coverage.

These are the basic factors making economies possible, as has been proven by the many firms who have followed through on suggestions similar to these. Every plant can effect them if they too will carefully analyze the factors involving economical spray application.

"MISS KELSEY IS SO FEMININE!"

Editor's Notes

85% of "quality" is controlled *between gun and ware.*

Maintenance of proper temperature and humidity has a lot to do with orange peel. 40% humidity and 75° F. temperature suggested as ideal for spraying rooms.

Rework is disastrous to cost structures. Cases have been found where it costs seven times as much to refinish a product as to do the original finishing.

Materials savings up to 40% have been noted *where operators are properly trained.*

Water-wash booths are a genuine asset in the plant *if maintained*, but proper maintenance is a must.

---

the authors

H. A. Barbian, The Dow Chemical Company, Midland, Michigan

R. C. Gibson, Parker Rust Proof Company, Detroit, Michigan

R. L. Huber, Hercules Powder Company, Wilmington, Delaware

L. W. Lammiman, The DeVilbiss Company, Toledo, Ohio

R. I. Wray, Aluminum Company of America, New Kensington, Pa.

It's as easy as this . . .

FOR *Real Host* GAS RANGES

Another range with a PERMA-VIEW window. It is the product of Harry C. Weiskittel Co., Inc., Baltimore.

PERMA-VIEW

. . . THE WINDOW YOU CAN SEE THROUGH *Always*

The easy, economical method of offering "visible baking" as a sales feature for your range is to use PERMA-VIEW oven door windows.

The strong steel encased, double pane PERMA-VIEW window incorporates the finest quality heat resisting glass. It is mechanically sealed to prevent infiltration of vapors and to keep the window "clear" permanently.

PERMA-VIEW is the fastest growing feature in the range field today. We can work with your engineering department and you can offer this feature on ***your*** range in a very short time. Call or write today.

MILLS ENGINEERING COMPANY

3683 EAST WILLIS DETROIT-7-MICHIGAN

Relationship between color, type of alkali ions, and adherence of enamels containing cobalt oxide

(Continued from Page 21)

In order to determine the relationships between color, adherence, and type of alkali ion, enamels "A" and "B" were blended to produce a series of five enamels including the end members all containing 0.5 cobalt oxide but varying in concentration of lithium and potassium ions.

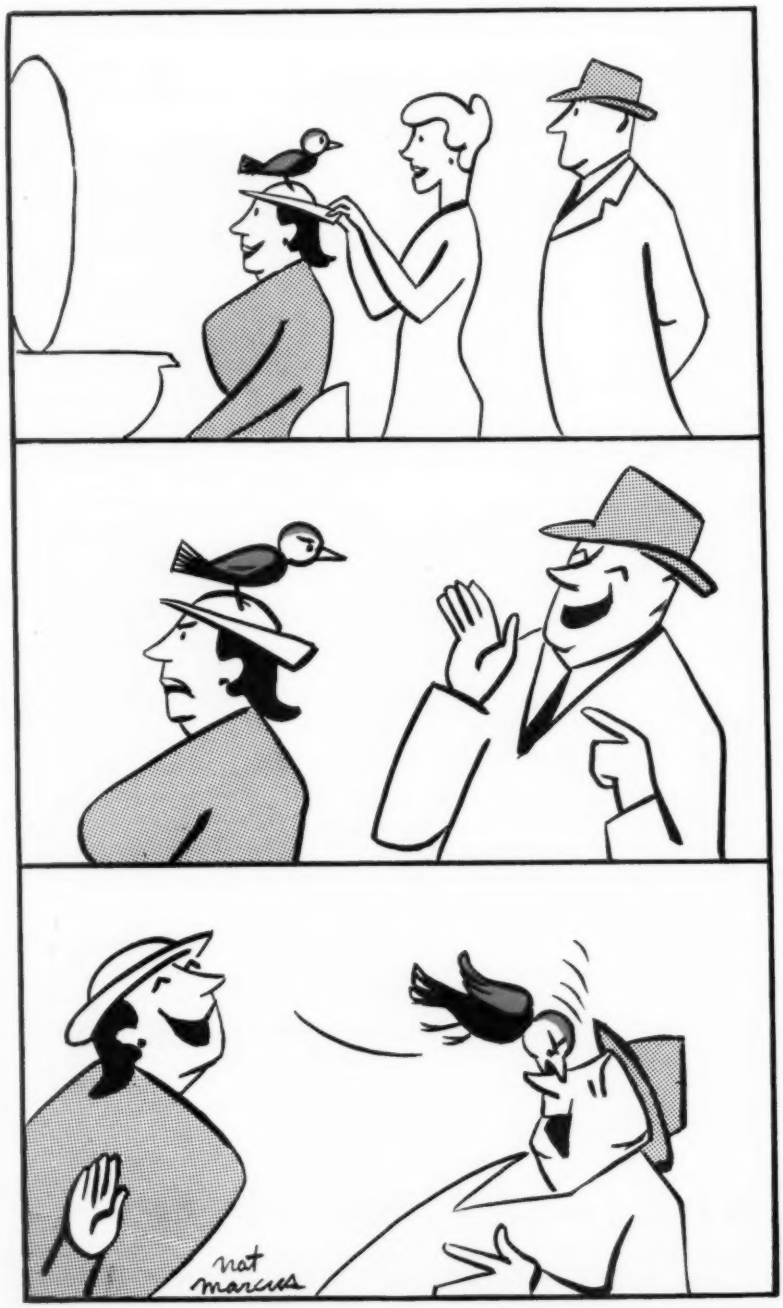
Discussion of results

In Figures 1 and 2 are plotted the extinction coefficients (E) at various wave lengths (*gamma*) for enamel composition highest in lithium ions, Enamel A Table IV, and for the enamel composition highest in potassium ions, Enamel B Table IV. Tables III and IV show several ratios of E which are significant. In addition, Table IV shows the adherence values for several mixtures of Enamels A and B as well as those for A and B.

Ratio R_1 indicates the relative number of red absorbing groups, blue in color, by its magnitude in the range 700-800 millimicrons. R_2 evaluates the relative number of red absorbing groups as compared to the blue absorbing groups in the five enamels. All of these values show that the enamels high in potassium ions contain relatively more red absorption groups and fewer blue absorption groups than the enamels high in lithium ions.

The values for R_2 in Table IV when compared with adherence values show that the highest adherence is obtained when the blue CoO_4 groups are lowest in number, that is in the enamel high in lithium ions, and adherence values are lowest when the blue CoO_4 groups are highest in number, that is in the enamel high in potassium ions.

This research, therefore, has not confirmed Weyl's theory.



Acknowledgment

The authors acknowledge with thanks the helpful advice and assistance of Prof. James I. Watters, of the Chemistry Department of The Ohio State University, in the preparation and interpretation of the absorption data.

1. R. M. King, "The Nature of Enamel Adherence", Finish, Vol. 4, No. 9, page 37, 1947.
2. W. A. Weyl, "The Replacement of Oxygen in Glass and its Effect on Adherence", Glass Industry, Vol. 23, No. 4, page 135, 1942.
3. R. M. King, "The Adherence of Glass to Metal", Glass Industry, Vol. 23, No. 11, page 419, 1942.
4. The International Nickel Company sponsored this investigation.

CLYDE STOCKHOLDERS APPROVE MERGER WITH WHIRLPOOL

At a meeting on March 10, stockholders of Clyde Porcelain Steel Corp., Clyde, Ohio, approved a merger into Whirlpool Corporation, of St. Joseph, Michigan. Whirlpool stockholders were expected to approve the merger at a meeting in New York City, March 27. Directors of both companies approved the measure earlier this year (February 1952 *finish*).

HOMMEL CERAMIC MASTERPIECE SERIES*

HOMMEL MATERIALS MAKE *Masterpieces*

Porcelain Enamel Frit

There's more than uniformity through quality control in Hommel Frit, there's the assurance that each batch will produce a true masterpiece. Enamelers on the production line recognize the dependable performance of Hommel Frit and management knows the consistent sales advantages of quality production. The combination of both features are your guarantee that Hommel Frit produces a porcelain enamel finish that labels every product a masterpiece.

Sales representatives throughout the world

THE O. HOMMEL CO. PITTSBURGH 30, PA.

POTTERY • STEEL AND CAST IRON FRIT
CERAMIC COLORS • CHEMICALS • SUPPLIES
Our Technical Staff and Samples are available to you without obligation. Let us help with your problems.

World's Most Complete Ceramic Supplier

Associate Company — ENGLAND, C. J. Beines & Co., Ltd., Stoke-On-Trent, Manufacturers of Porcelain Enamel Frit for Steel.

Warehousewoman,

or Who Forgot the Retailer?

THIS is a lady who was presold by consumer advertising. Nobody underestimated her—in fact she was estimated beautifully. She wanted to buy, set out to buy, tried hard to buy. But somebody forgot the retailer and she couldn't find what she wanted. So she bought a carload from the manufacturer and nobody lived happily ever after.

* * *

No matter how well a national advertiser gets his story across to the consumer, unless his merchandise has been advertised to the trade, his pre-selling job is a fizzle.

Trade paper advertising is insurance—the small premium which protects a large advertising investment. It helps move your merchandise into the channels of trade. It enables you to reach retailers—and educate their salesmen. It allows you to strengthen your competitive position by merchandising your consumer advertisements.

There is an appropriate business paper which reaches your important merchandising groups, where your advertising can concentrate on filling the channels of distribution in an editorial atmosphere conducive to sales. Ask your agency for recommendations about the right business papers to reach your logical markets. Or write us for suggestions.

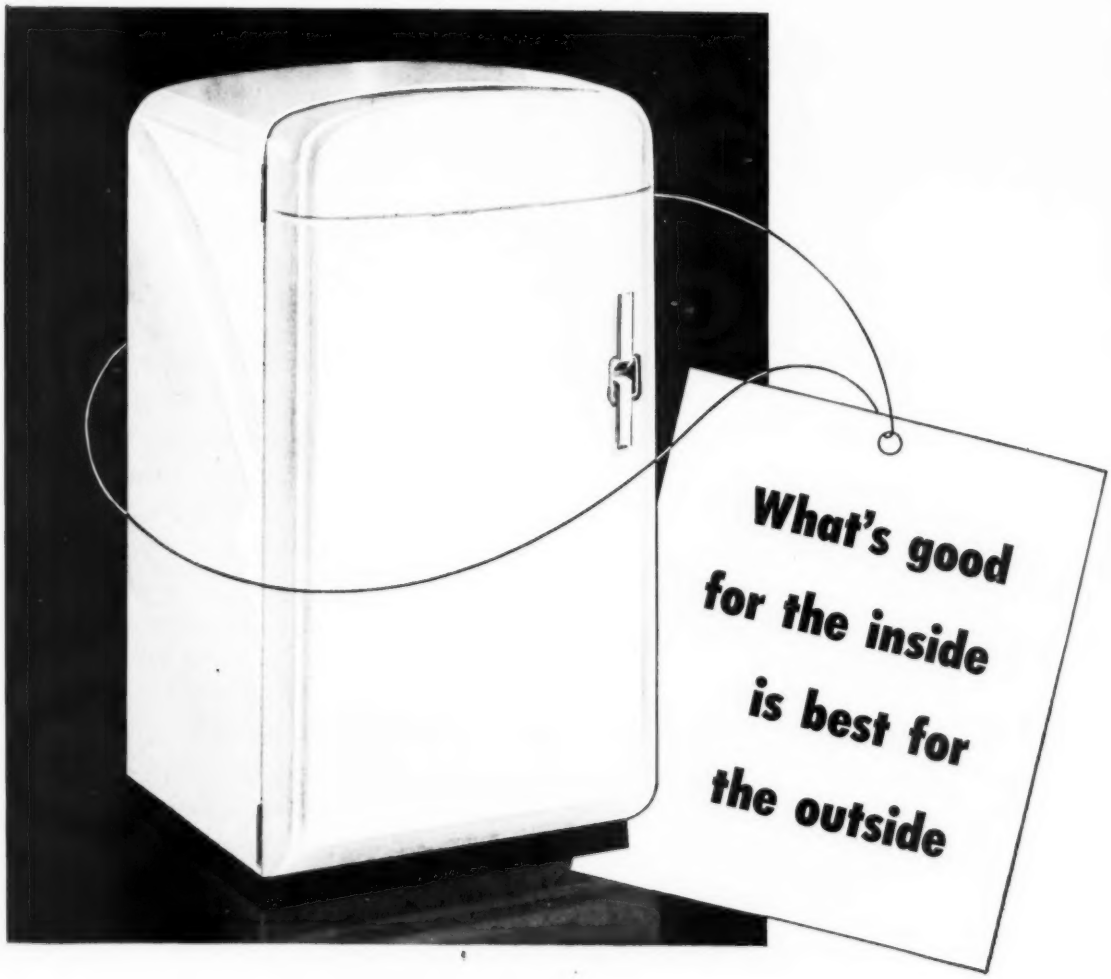
NATIONAL BUSINESS PUBLICATIONS, INC.

1001 FIFTEENTH STREET, N. W. • WASHINGTON 5, D. C. • STerling 7535

The national association of publishers of 129 trade, technical, scientific and professional magazines, having a combined circulation of 2,956,066 . . . audited by ABC and CCA . . . serving and promoting the business press of America . . . bringing thousands of pages of specialized know-how and 139,298 pages of advertising to men who make decisions in the trades, sciences, industries and professions . . . pinpointing your audience in the market of your choice. Write for complete list of NBP publications.

NOTE: The finish business manager presents this ad as "food for thought" for appliance and other metal product manufacturers — and — urges that raw material, equipment and component manufacturers consider the logic of this reasoning in relation to *all* industrial advertising programs.

FINISH, an NPB publication, serves the appliance and metal products *manufacturing* industries.



Use U·S·S Vitrenamel— the finest enameling base

● Refrigerator exteriors deserve the same lasting protection the inside gets and that's the permanent non-fading protection assured only by porcelain enamel on steel. Housewives like this good-looking, easy-to-clean, durable finish. They've had experience with it on their kitchen ranges . . . they'll appreciate it on their refrigerators, too.

The ideal steel base is U·S·S Vitrenamel. Its special surface texture promotes maximum adhesion. As a result, the steel is protected against corrosion and the finished product has a permanently beautiful and durable surface.

You'll find the familiar U·S·S Vitrenamel label on your product an added sales point for appliances made from this quality steel.

U·S·S VITRENAMEL

UNITED STATES STEEL COMPANY, PITTSBURGH: COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

2-488

UNITED STATES STEEL

WHIRLPOOL NAMES NEW EXECS.

The Whirlpool Corporation, St. Joseph, Mich., has announced the election of Robert M. Mitchell and Robert C. Upton as vice presidents, and the appointment of LeRoy W. Howard as marketing director.

HILL NAMED TREASURER OF CRIBBEN & SEXTON

The board of directors of Cribben & Sexton Company, Chicago, has announced the appointment of Sidney R. Hill as treasurer. He will continue, however, as controller, a position he has held for the past five years.

The announcement stated that the appointment was made to relieve Wendell C. Davis, president and treasurer, of the latter responsibility so that he could devote his full time to administrative affairs.

NORGE DEFENSE, CIVILIAN WORK IN SAME PLANT

Six major sections of the Thunder Jet fighter plane are being produced along with refrigerators in the Muskegon Heights, Mich., plant of Norge Division, Borg Warner Corp.

"Our facilities and the skills of our personnel are best adapted to sheet metal fabrication and assembly so that a minimum of conversion is necessary in taking defense contracts," stated J. W. Webster, central sales manager of the division.

Webster added that the Norge had excellent response to a brochure on its facilities which were circulated last summer to purchasing agents of every air frame manufacturer in this country.

"RENOWN CORPORATION"

Renown Stove Company, Owosso, Michigan, has announced that its company has been changed to Renown Corporation.

Readers of *finish* will recall that in 1950, Renown disposed of stove patterns, inventory of stove parts, and the trade name Renown as used on ranges, to Prizer-Painter Stove Works, Reading, Pa.

CROSLEY TO MAKE ARMAMENT EQUIPMENT FOR JET BOMBERS

The Crosley Division of Avco Manufacturing Corporation, Cincinnati, has been designated by the U. S. Air Force as a producer of armament equipment for the Boeing B-47 Stratojet bomber, believed to be the fastest bomber in the world.

The B-47 has six jets and is listed by the Air Force in the 600-mile-an-hour class. Boeing is now producing the bomber in substantial volume, and additional numbers of the craft will be built by both Lockheed and Douglas.

The armament equipment for the medium bomber was developed and also is being produced by General Electric Company, Schenectady, N.Y.

MC CRAY CHANGES NAME

"McCray Refrigerator Co., Inc.," is the new name of The McCray Refrigerator Co., Kendallville, Indiana.

CORDLEY & HAYES NAMES LYNN

Cordley & Hayes, New York City, manufacturers of electric water coolers, have announced the appointment of P. R. Lynn as director of field engineering. Lynn had been with General Electric Company since 1930, and was last in charge of product planning for water coolers.

GEORGE JONES OF SERVEL SEEKS SEAT IN CONGRESS

It is reported that George S. Jones, Jr., vice president, Servel, Inc., has made formal announcement of his candidacy for nomination on the Republican ticket for the Eighth Congressional District of Indiana.

Jones, a past president of the National Federation of Sales Executives, has been a sales executive in the refrigeration industry for more than 20 years. *(A late report states that Jones has resigned from Servel.)*

TO EXPAND DUCHESS LINE OF HOME LAUNDRY PRODUCTS

R. F. Doyle, vice president and general manager, Appliance Mfg. Co., Alliance, Ohio, has announced the appointment of Jules Alexandre as sales manager. The appointment is part of the company's long-range program to develop and market additional products under the firm's "Duchess" brand, said Doyle.

The company has specialized in wringer-type washing machines, and is now producing a new dehumidifier. Soon to follow are electric and gas clothes dryers and an automatic clothes washer. Other related major home appliances, now in the development stage, are to be added to the Duchess line as quickly as possible, it was stated.

ELECTRIC RANGE, WATER HEATER SALES FOR 1951

Sales of electric ranges by manufacturers reporting to NEMA totaled 1,269,509 during 1951, compared with 1,602,382 in 1950. Water heater sales by manufacturers in the NEMA group totaled 674,533 units, compared with 809,554 in 1950. Both sets of figures were compiled by the

National Electrical Manufacturers Association.

1951 REFRIGERATOR SALES

Sales of electric household refrigerators by manufacturers reporting to the National Electrical Manufacturers Association totaled 3,797,260 units in 1951. This compares with 6,225,000 units sold in 1950, the industry's highest year.

PERFECTION PROMOTES THREE IN MANUFACTURING DIVISION

HOWARD SAGE

D. N. GREDYS

H. A. CONSOR

Perfection Stove Company, Cleveland, O., has announced three promotions in its manufacturing division. Howard Sage was appointed production engineering manager; D. N. Gredys named general superintendent of the Platt Avenue plant; and H. A. Consor named to the newly-created post of quality control manager, with responsiblity for all inspection at Perfection's Platt and Ivanhoe Road plants.

Following his graduation from the Case Institute of Technology, Sage joined Perfection in 1933 as a ceramic engineer. Since 1947 he had been general superintendent of the Platt plant.

Gredys, also a Case Tech graduate, joined the company in 1935 as a ceramic engineer at the Ivanhoe plant. He rose to become assistant general superintendent of first the Ivanhoe and then the Platt plant.

A University of Michigan graduate, Consor has been with Perfection since 1946 when he was made assistant foreman of the Platt press room. Last year he was named assistant general superintendent at Platt.

***Pressed Metal Institute held open house**—in new quarters on February 29. Shown in one of the modern offices are Orrin B. Werntz, PMI managing director, and Howard Wolf, of Mullins Mfg. Corp., and 1950-51 Institute president. Offices are located in a new building at 2860 East 130th St., Cleveland 20, Ohio.*

AFTER 40 YEARS, STRONG TO GO OUT OF BUSINESS

Stockholders of The Strong Mfg. Co., Sebring, Ohio, recently authorized its directors to sell all the company's assets and go out of business. The decision to sell the 40-year-old company, which manufactures porcelain enamel ware, was made by the stockholders in approving a recommendation of its directors and Sidney G. Rose, president.

RENOWN AWARDED $5 MILLION LOCKER CONTRACT BY ARMY

Renown Corporation, Owosso, Mich., has been awarded a $5,000,000 contract by the U.S. Army for the manufacture of steel wall lockers. According to Army officials, this is the largest single procurement of wall lockers ever made by the U.S. Army.

Production will begin in June, according to Bernard A. Nagelvoort, president of the company formerly known as Renown Stove Company.

Some additional stamping presses and welding equipment must be installed, Nagelvoort reported. He also indicated that the company will have to add at least 200 more workers.

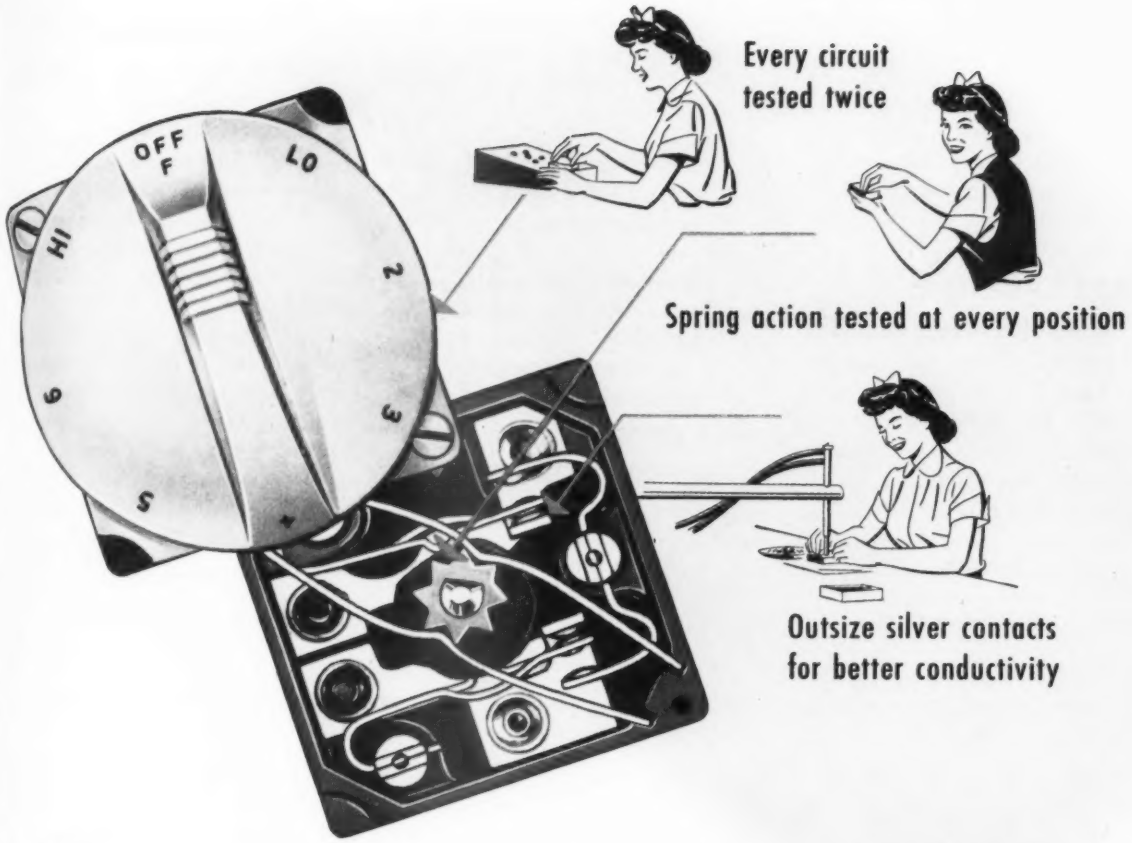
Renown is currently manufacturing gasoline dispensing units.

SUNROC ACQUIRES SHEET METAL PLANT IN N. J.

The Sunroc Company, Glen Riddle, Pa., has announced the acquisition of its own sheet metal plant at Palmyra, N. J., for the purpose of manufacturing water cooler cabinet and other sheet metal products.

In making the announcement, Orville C. Morrison, president, stated that the subsidiary company would be called the S.O.M. Mfg. Co. in honor of his father, the late Samuel O. Morrison.

The plant was formerly owned by Harold Venzie, who was named president of S.O.M. Mfg. Co.



Why you get better switches from **FERRO**

In today's market, every component that goes into your ranges must not only give long, trouble-free service—it must also help you sell! Thanks to superb engineering, precision manufacture and careful inspection, these switches do just that!

For Ferro switches are easy to operate, have positive contact action. They're attractively styled for modern ranges. And their rugged design virtually eliminates service failures and expensive field replacements.

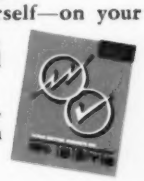
Reasons? Phosphor bronze springs that maintain permanent tension. Large silver contacts. Long-wearing plastic cams molded to steel shafts. Plastic barriers that insulate and do away with exposed terminals . . . making "shorts" practically impossible.

Ferro switches permit better grouping, are fast and simple to install. The neat, one-piece molded Bakelite case is only 1¾" square.

You have a wide variety of shafts, handles, handle markings and colors . . . and nearly 100 different circuits to choose from.

So specify Ferro switches. Already standard equipment for 29 manufacturers, they look better, are easier to install and operate longer.

Proof? Test Ferro switches yourself—on your own ranges—in your own plant. Send us your circuit requirements and we'll forward samples.



And—write for this new catalog. It contains complete information on Ferro switches and controls.

FERRO

FERRO ELECTRIC PRODUCTS, INC.

A Subsidiary of Ferro Corporation

KIRKLAND, ILLINOIS

MIDWEST ENAMELERS MAYPOLE PARTY, MAY 23

The annual Maypole Party of the Midwest Enamelers Club will be held May 23 at the Sportsman Golf Club, Chicago, it was announced by A. B. Friedmann, chairman of the Maypole Party Committee.

OESTERLE COMPLETES 50 YEARS IN ENAMEL BUSINESS

At a special dinner, February 23, Henry Oesterle, owner, Roesch Enamel & Mfg. Co., Belleville, Ill., was honored for completion of 50 years in the enameling business.

A native of Germany, Oesterle began his career with New Castle Stamping & Enameling Co., New Castle, Pa., when he was 18 years old. He subsequently worked in plants at Canadaigua, N.Y., and Buffalo, N.Y. In 1909, he went to St. Louis to become a superintendent at A. Geisel Mfg. Co. The next ten years he spent as superintendent of plants in St. Louis, Terre Haute, Ind., and Geneva, N.Y., and in 1922, was named general manager of the Roesch enameling department.

In 1932, Oesterle became vice president and general manager, and in 1947 was elected president. With a son, he purchased in April, 1950, the controlling stock of the firm.

PEMCO EXPORT MANAGER HEADS FOREIGN TRADE FORUM

At a recent meeting held in Baltimore, Maryland, Albert Kellner, export manager, Pemco Corporation, was elected president of the Baltimore Foreign Trade Forum for 1952.

N. W. OHIO INDUSTRIAL GROUP ELECTS NEW OFFICERS

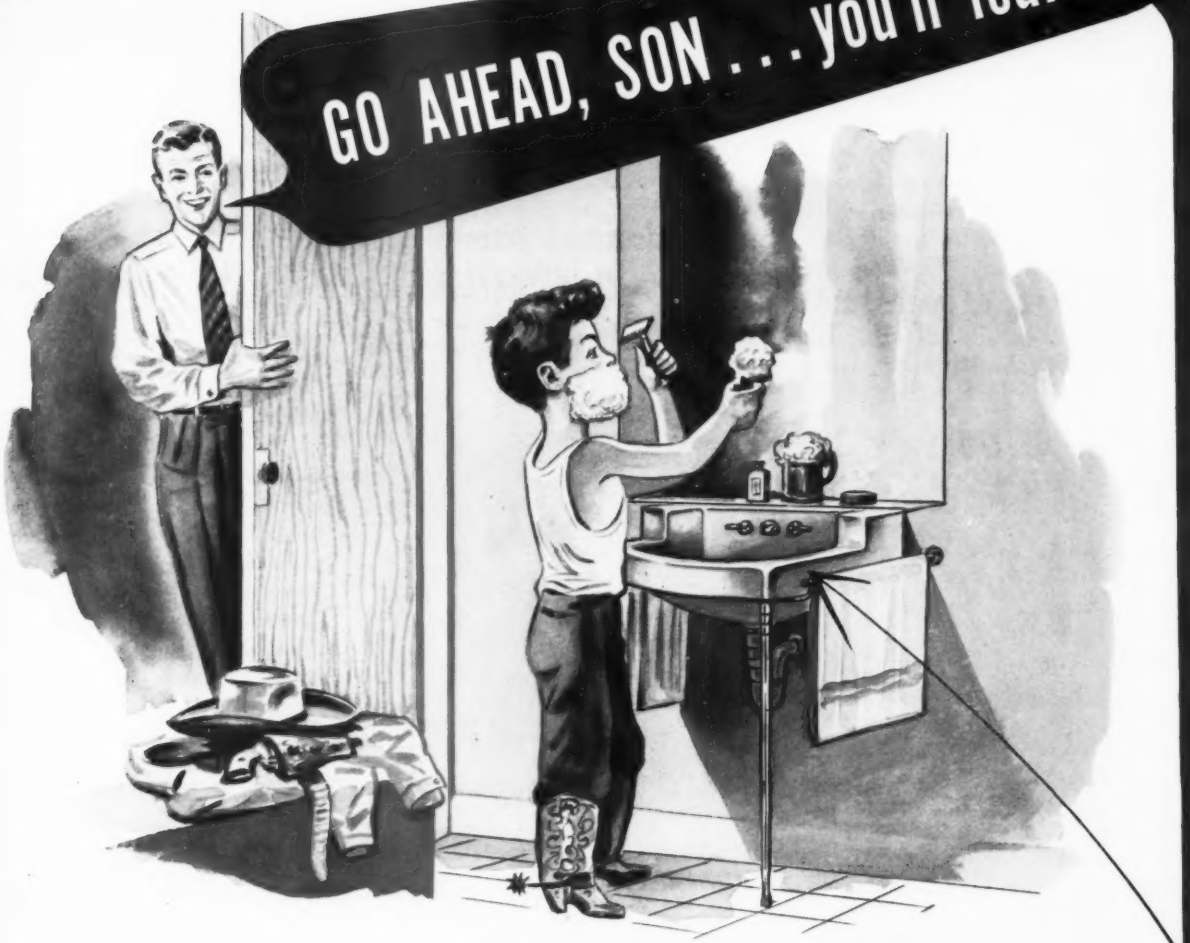
Ray L. Morrison, executive vice president, The DeVilbiss Company, has been elected president of the Northwestern Ohio Industrial Council. He succeeds Jules D. Lippmann, president of the Textileather Corporation, who was the Council's first president.

Elected vice president of the Council was Joseph L. Tillman, president, Unitcast Corporation. William H. Schomburg, president and treasurer, Superior Spinning and Stamping Co., was named secretary-treasurer.

The Northwestern Ohio Industrial Council was organized in 1950 to provide a fact finding and evaluating organization for the diversified industries of the Toledo area.

Finish candid camera photos — *taken at Central District Enamelers Club meeting, February 15. C. P. Lohman, of Pemco Corporation, addressed the group on "101 Uses of Porcelain Enamel."*

GO AHEAD, SON . . . you'll learn!



Let PEMCO solve your technical problems

Next to the quality of its materials, Pemco prides itself on the continuing service it performs for the porcelain enameling industry. If you have a technical problem, we invite you to discuss it with our laboratory technicians and engineers. Wire, phone or write today! There's no obligation, of course.

Yes, young man, you'll learn that shaving won't always be fun when you grow up. You might learn too why dad doesn't get sore when you drop something on the wash bowl. He knows it's porcelain enamel, the finish that is permanently beautiful, that cannot fade or discolor, that doesn't wear, mar or scratch. But even dad might not know about Pemco. You see, Pemco makes the frit that makes just about the best porcelain enamel there is. Most of the best manufacturers of porcelain enameled products know this. They learned from experience, just as Pemco itself—through 41 years of pioneering, research and development—learned. With Pemco, you can be sure!

"After All, It's the Finish that Counts"

PEMCO CORPORATION

5601 EASTERN AVE.
BALTIMORE 24, MD.

"Always Begin with a Good Finish"

Copyright 1952, Pemco Corporation

"THE WORLD'S FINEST" PORCELAIN ENAMEL FRITS • GLAZE FRITS • PORCELAIN ENAMEL COLORS • GLAZE STAINS • GLASS COLORS AND RELATED CERAMIC MATERIALS

MORRISON STEEL FOUNDER DIES

Jacob Morrison, founder and chairman of the board, Morrison Steel Products, Inc., Buffalo, died January 22. Although not active on a national basis in recent years, Mr. Morrison was well-known in Pressed Metal Institute circles.

MARSHALL, OF MACCO, DIES

John Marshall, field engineer in charge of the St. Louis territory for Macco Products Company, died March 11, following an extended illness. Friends in the metal working field in Missouri, Kansas and southern Illinois will regret to hear of his death.

WILLIAM DRAKE HEADS OPS CHEMICALS DIVISION

William P. Drake, vice president - sales, Pennsylvania Salt Manufacturing Co., has been named director of the Rubber, Chemicals and Drugs Division of the Office of Price Stabilization, it was announced by Michael V. DiSalle, OPS director. Drake will serve as director until July 1, said DiSalle.

FERRO NAMES GRUBER ASSISTANT CHIEF ENGINEER

C. D. Clawson, president, Ferro Corporation, announced that Paul S. Gruber has been promoted to assistant chief engineer of Ferro's engineering division.

Gruber has been with Ferro since 1930, when he joined the engineering division as a draftsman. During World War II, he served as a field engineer engaged in the design and construction of heat treating furnaces for plants throughout the country.

For the past two years he has been working with General Electric on the installation of porcelain enameling equipment in that company's new appliance manufacturing plant in Louisville, Ky.

EMMETT HEADS DETREX NEW PRODUCTS DEPARTMENT

The creation of a new products department and the appointment of John P. Emmett as its head have been announced by A. O. Thalacker, vice president and general manager, Detrex Corporation, Detroit. The formation of the department resulted from the company's extensive research program and increased activity in new product development.

Emmett will handle the market research and sales development of all new products, including industrial, while they are in the pre-marketing phases. The company's program of market expansion, under Emmett, will involve the acquisition of raw materials in the manufacture of future product developments, as well as the expansion of plant facilities. New uses for existing products and problems of foreign trade will be some of the responsibilities of this department. During his six years with Detrex, he gained broad experience in the sale and service of the company's industrial cleaning equipment and chemicals.

Ransburg NO. 2
PROCESS
The World's Finest
Spray Finishing Equipment
Ransburg finishing systems—in operation from coast to coast, and in foreign countries, as well —are acclaimed as
THE MOST EFFICIENT SPRAY COATING PROCESSES EVER DEVELOPED
On most production lines, the No. 2 Process will give 25% to 75% more pieces per gallon than ANY other spray finishing system. In no case is there any overspray to be exhausted with the Ransburg No. 2 Process.
Electrostatic Painting Processes
RANSBURG ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

ROBINSON HEADS CARBORUNDUM

The Carborundum Company has announced the election of Clinton F. Robinson as president and director, succeeding H. K. Clark who resigned. Robinson is a retired major general, Corps of Engineers.

CHAMBERS NAMED FOOTE PRES.

The election of Gordon H. Chambers as president of Foote Mineral Company, has been announced by H. C. Meyer, newly appointed chairman of the board.

U.S.S. INDUSTRIAL HYGIENIST

Appointment of Kenneth M. Morse as industrial hygienist for United States Steel Company, Pittsburgh, was announced by E. E. Moore, vice president — industrial relations administration. This new position will be correlated and coordinated with the company's industrial hygiene and occupational health program.

Morse joined U.S.S. from the American Foundrymen's Society, Chicago, where he was director of safety in hygiene and air pollution program.

HEADS TWO SEARS BUYING DEPTS.

Sears, Roebuck & Co., Chicago, has announced the appointment of Carol W. Jones as head of its freezers and household refrigerators buying departments. It was indicated that John A. Hurley, who has been head of the refrigerators and washers-ironers-dryers departments, will continue as head of the latter.

KRAFT DIVISION TO SERVE METAL FINISHING INDUSTRIES

Gerald G. Kraft, of Kraft Chemical Company, Chicago, has announced the formation of the Kaynide Division. This new division will be devoted exclusively to the plating, heat treating and allied metal finishing industries, and will take over the sales and warehousing of chemicals, anodes, processes, equipment and plating supplies formerly sold by Kraft Chemical Company. Through its technically trained staff, the Kaynide Division will be in a position to install any size plating process, the report states.

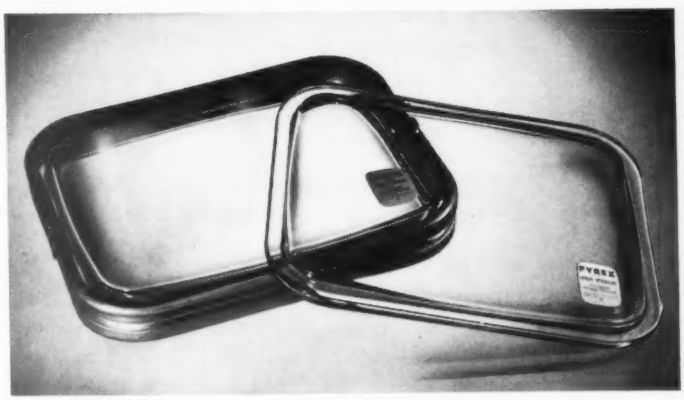
The Kaynide Division has established a department specially trained to keep its customers informed of changes in the Government price control set-up and its effect on the plating industry.

WESTINGHOUSE UPS SARGENT AND OLIVER

The appointments of R. J. Sargent as manager of major appliances, and R. M. Oliver as manager of appliances specialties, were announced by T. J. Newcomb, sales manager, electric appliance division, Westinghouse Electric Corp., Mansfield, Ohio. The appointments are new posts designed to fill the need for the supervision and coordination of the two appliance product groups in line with the company's expansion program in the electric home appliance field.

Sargent will be responsible for the supervision and coordination of all

You're ready to go . . . with PYREX Oven Windows
BRAND



Easy to Install • No Mold Charge • Stocked for Prompt Shipment

Single Panel or Complete Double-Pane Assembly

Here's the cure for your oven window headaches—PYREX Brand Oven Windows. Plain or assembled, Corning can give you exactly what you want without mold charges—you pay only for the glass. And they are shipped to you from stock, ready for easy and economical installation!

What's more, with PYREX Brand Oven Windows, you have the added advantages of the finest in strong, crystal-clear, smartly styled heat-resistant glass. For extra sales appeal, the PYREX trademark tells the housewife she's getting the best. It's a trademark she knows and respects on a range feature she demands.

So, why not let Corning take your oven window problems off your shoulders? Our engineers will be glad to give you all the help you need. For further information, write today.

CORNING GLASS WORKS, CORNING, N. Y.

Corning means research in Glass

VISIT THE NEW CORNING GLASS CENTER

PYREX brand Oven Windows VYCOR brand Burner Plates Oven Lightingware
PYREX brand Plate Glass Range Top Lightingware Other Range Specialties

activities associated with major appliance product departments, including engineering, production, advertising, sales and service. Oliver will have the same broad responsibilities for appliance specialties which include vacuum cleaners, fans, electric housewares, etc.

BOZSIN BOOK ON INCREASING QUALITY, LOWERING REJECTS

Michael Bozsin, of Ferro Corporation, Cleveland, O., has compiled a book entitled "Chemical and Physical Determinations for Porcelain Enamel Plants." The object of this compilation as stated in the book's preface is to "describe, in detail, quantitative analytical procedures for the determination of all deleterious gases (halides, sulfur compounds, moisture, carbon monoxide, and oxygen), pyrometric and draft measurements and their significance for the production of quality porcelain enameling and lowered rejects, with consequent savings in operating costs."

The six chapters cover Chemical Procedure, Sources and Effect of Sulfur Trioxide on Porcelain Enamel, The effect of Fluorine and Chlorine on Enamel Plant Operation, Determination of Combustion Efficiency, Draft Determination and Pyrometric Practice, and Determination of Fire-Box Temperatures.

The 76-page book has an extensive appendix of charts and tables covering relative humidity, vapor pressure, temperature conversion, etc.

For a free copy of this book, write on your company letterhead to *finish*, or to Ferro Corporation.

BINKS ANNOUNCES SPRAY PAINTING SCHOOL SCHEDULES

Binks Manufacturing Company, Chicago, has announced schedules through June for its spray painting school. New classes will be held Monday through Friday: April 2-6, May 7-11, and June 4-8.

The school is said to be especially suitable for training officials, foremen and supervisors. Classes are limited in size so that each individual obtains maximum personal attention from the instructor. Also, classes are usually composed of men with similar interest. However, Binks points out that enrollment is not limited to officials and supervisor. Anyone who may benefit from the training is welcome.

William Beacham, nationally-known paint chemist and spray painting authority, is in charge of the classes which are conducted at the Binks plant. Beacham is also director of the company's research laboratory.

During the five-day program, each member of the class examines and discusses the operation, maintenance and repair of spray guns. Men who have never used a spray gun before are taught correct spray painting methods. Trouble-shooting gets a lot of attention. The common causes of faulty spraying are described and methods of avoiding or correcting them are explained. Several sessions deal with automatic spray finishing systems.

William Beacham tells a class how to use air-operated material handling pumps. These pumps are one of the latest developments in solving material handling problems. These pumps may be used for applying paints, lacquers, varnishes and other light fluids, as well as for sealers, pastes and other heavy materials.

FAHRALLOY ADVANCES RASMUSSEN AND KROC

On the eve of the 20th anniversary of The Fahralloy Company, Harvey, Ill., A. Rasmussen, former sales manager, was named vice president and plant manager, and Robert E. Kroc, former assistant sales manager, named sales manager.

Kroc has had experience in the design, production and marketing of chromium-nickel and stainless steel castings which the company produces in Harvey. Canadian affiliate is at Orillia, Ontario.

TEN YEARS OF M&T RESEARCH

The Woodbridge Research Laboratory of Metal & Thermit Corporation celebrated its tenth anniversary with an open house on March 1. High point of the occasion was the cutting of the birthday cake by Dr. C. Kenneth Banks, vice president of research and development.

The New Jersey laboratory was designed and constructed for the specific purpose of research. Metal & Thermit had been engaged in research before 1942, but these activities were carried out in plant laboratories. About 1940 the decision was made to centralize research and development activities and organize a separate research department.

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Are Best in Every Way

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Low in glass content, McDanel Mill Lining Brick gives maximum resistance to wear and long, satisfactory service. Complete size range to fit every size mill.

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Be sure to specify McDanel Mill Head Assemblies on your new mills. No metal can contaminate your mill charge with these patented covers. They are tops for uniformity of batch and long service.

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Protected with heavy gage steel jacket McDanel Metal Covered Grinding Jars and Mills are easy to handle, easy to clean, discharge rapidly and stand up under long usage.

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McDanel Porcelain Products Catalog

McDanel — *the original* — Metal Covered Grinding Jars never chip, crack or break. You use them and use them till they are worn out completely; and then, for a fraction of the cost, a new liner can be substituted for the old.

McDanel Jars are quality, long-wear porcelain with heavy gage metal case. They are easy to handle, to clean, to discharge. They come in standard sizes and jar and cover surface are precision ground to fit to prevent leaks.

McDanel Jars are provided with rubber tires for roller machines. These tires are securely held in place by metal lugs spot welded to the case. McDanel offers the very latest and best in Grinding Jars — yet McDanel Metal Covered and All-Porcelain Grinding Jars cost no more.

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CHICAGO VITREOUS ENAMEL PRODUCT CO., Cicero, Illinois. Exclusive representative for the Enamel Industry

GENERAL ELECTRIC UPS CURLEE

The appointment of Neil J. Curlee to a newly-established position as manager of manufacturing, product service, major appliance division, General Electric Co., Louisville, was announced by J. H. Miller, manager of product service.

ROPER UPS CY EDWARDS TO MERCHANDISING DIRECTOR

E. Carl Sorby, Geo. D. Roper Corp., Rockford, Ill., has announced the appointment of Cy Edwards as merchandising director. He will act as coordinator between the sales, merchandising and advertising departments. He served as general advertising manager for seven years.

DU PONT WEST COAST APPT.

Dr. Jack B. Callaway has been appointed manager of west coast sales for the pigments department of the Du Pont Company, succeeding Robert P. Enslin, who died last year. His headquarters are in Los Angeles.

FOWLER RESIGNS AS FLORENCE BOARD CHAIRMAN

Robert L. Fowler, a key figure in the management of Florence Stove Company for the past 21 years, announced his retirement as chairman of the board at a recent meeting of Florence directors.

Fowler was president of the company from 1931 to 1945, at which time he was elected chairman. He had served as factories manager for Sears, Roebuck & Company from 1927 to 1931.

Under his direction, Florence factories were developed in Kankakee, Ill., and Lewisburg, Tenn., in addition to the original factory at Gardner, Mass. — aiding in the production and distribution of a complete line of Florence ranges and heaters.

Sales of Florence products increased from approximately $4,500,000 in 1931 to more than $30,000,000; total assets jumped from approximately 3½ million dollars to over 18 million dollars. During his 21 years with Florence, dividends to stockholders were declared regularly every year. At the time Fowler became president, the company employed a little over 1000 persons; today, with three modern plants, 3200 persons are working under the Florence banner.

TOWE HEADS CYANAMID

Kenneth C. Towe, vice president in charge of finance, has been elected president of American Cyanamid Company, succeeding the late Raymond C. Gaugler. Towe has been a director of the company since 1939.

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Eliminate hazardous solvent cleaning and expensive chlorinated degreasing installations. Find out about KLEM'S new Rust-Sol—a concentrated phosphoric acid cleaner that gives metal a slight etch which provides an excellent paint bond. Rust-Sol imparts a neutral iron phosphate coating to the metal surface for long paint life. Rust-Sol is suitable for a wash off or wipe off type application or can be used in immersion and spray systems.

—money-saving information

KLEM CHEMICAL

14401 LANSON

Conservation in enameling operations

→ *from Page 38*

Close pre-firing inspection will help reduce scrap and reworking. In the case of finish coat scars, water spots, etc. can be detected and repaired or washed and resprayed. In this case, the cost of washing and re-spraying must be balanced against the cost of reworking with the extra chance of eventual scrapping due to warpage.

The amount of reworking possible varies considerably from plant to plant. On some pieces spot patching would not pass inspection. In that case, de-enameling would be necessary after a limited number of full re-coats. Since inspection standards of refrigerator liners, for instance, do permit spot-patching, consider-

able development of salvaging methods has been done in our plant.

Early diagnosis of the seriousness of a certain defect is important. For instance, when blisters appear on a weld, we must decide whether to simply stone and spot-spray or sand-blast and rework up from the steel surface. If the blistering is severe, simple spot-spraying produces only larger blisters, and the liner has used up hanger space in the furnace and warped a little more.

Reworking ground coat defects

An operation which reduces scrap and reworking is that of overspraying zircon enamel on ground coat bisque where the top and bottom pieces are seam-welded to the liner center. The main reason for the zircon coat is to reduce burnoff without increasing the chance of getting hairlines. Reinforcing with ground coat enamel would produce hairlines as a result of the heavier coating. A second and important reason is that open welds show up as a black line and sharp metal particles show up on the white background. Tearing and blistering in the zircon coat do not prevent its effective use. The protruding metal particles are simply stoned down, but the open welds are gas welded without removing the ground coat in a fixture designed by our welding department. Needless to say, repair is much easier at this stage. In recent years weld repair went through three stages. At first, all open welds resulted in scrapped liners. Then the development of a welding fixture made it possible to salvage all liners still in ground coat only. Between stages came the zircon overspray which revealed many open welds which previously resulted in scrap in finish coat. Finally, a pencil sand-blast was used for removing enamel so that open welds which showed up in finish only could be repaired.

After rewelding a ground-coated liner which showed an open weld, the welded area is ground with a pneumatic grinding tool. If necessary, some cleaning is done by sand-blasting. Photo No. 2 shows the welded and cleaned area ready for repair. Patching is done by spraying ground coat. Most of the dry ground coat on nearby areas is wiped off, and the liner is fired. From this point on the liner goes through the normal process.

One type of steel defect which shows up in ground coat can be repaired if it is not too severe. When steel is bulged due to a lamination and the lamination is not over about one-half inch wide, often it can be repaired by drilling a hole in the back side and flattening the face side. Innumerable liners have been saved by this method.

A seam in the steel can sometimes be seen in the ground coat stage, but will not necessarily cause blistering in the finish coat. At this stage only a severe condition is sand-blasted.

Minor defects of all types are simply stoned if necessary and spot-sprayed lightly without removing from the furnace conveyor. Three types of more serious defects are marked for de-enameling with a pencil sand-blast. They are: blisters on welds; steel defect blisters, especially those in long rows; and open welds which did not show up after the ground coat firing.

The sand-blast operator (Photo No. 1) wears a hood which comes down to shoulder level, and a respirator. The booth is a tub of sand under a steel-topped table surrounded by metal walls in which are placed an exhaust fan, an air inlet grid, and a door. The blasting gun is made up

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of simple pipe connections. The air pressure used is line pressure in the shop — 100 lbs. per sq. in.

When blisters from a seam or pipe seam appear in the finish coat, a strip is sand-blasted about one-half inch wide along the row of blisters as shown in Photo No. 3. Then enough metal is removed to provide a smooth, sound basis for re-enameling. The sand-blasted strip is then sprayed with zircon enamel and set aside for drying. After the enamel is dried, it is rubbed down level and fired. If ground coat and white are fired separately, the liner should be fired with ground coat. After this point the liner is re-sprayed, fired and inspected.

If severe blisters are observed on the welded area or some blisters did not cover when reworked with a rubbing stone as shown in Photo No. 4, the welded area is sand-blasted as in the case of the seam in the steel. Again zircon enamel is applied as a first coat and fired. As seen in Photo No. 5, there is considerable blistering in the zircon on the steel. When blistering is severe as in this case, a second coat of zircon is applied and fired. Then the liner is processed as if it were in ground coat only.

If an open weld did not show up until the finish coat is applied, the liner is sand-blasted before welding and sent to the welding department. When the liner is returned the weld area is ground with a pointed grinding tool like ground-coat-only liners were and sand-blasted if necessary to clean up the weld area. After this, the patching operation is the same as for the other repairs.

Because of the tendency for larger blisters to result from simply spot-spraying small ones, there is a tendency to sand-blast the doubtful defects after the first cover coat firing.

Is de-enameling dangerous?

It is sometimes held that de-enameling tends to make operators more lax in preventing defects. That proposition is open to serious question. In the case of sand-blasting, a good deal was learned about which weld conditions would enamel properly and which would not. Actually, the rework technique served to make possible a reduction in the number of liners which needed reworking. To get down to figures, when the sand-blast operation was started, we sand-blasted on some days as high as 100 liners. After learning more about what to look for prior to pickling the number to be sand-blasted was cut to one-third that. These figures are based on about 1600 liners a day.

Does reworking pay?

You are by now probably asking yourselves, "What is the cost? Does it pay?" For our product the answer is definitely, *yes*. In the first place, quality is improved, for with steel short there was a tendency to accept liners which should not have been accepted, and liners warped from multiple firings were accepted if they could be forced into the cabinet. From the labor standpoint one man can process about 35 liners per 8-hour day. His work includes grinding. sand-blasting, patch spraying,

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and smoothing after drying. The cost then is roughly 1/7th the value of the liner. In addition we were able to stretch our available steel a little further. Our scrap runs about one per cent for all causes using cold rolled steel for liner centers and enameling iron for tops and bottoms. During some months the scrap runs as low as one-half of one per cent.

Adapted for finish from a paper before the Porcelain Enamel Institute's annual Shop Practices Forum for plant men.

Hard chrome plate in maintenance

→ *from Page 28*

The parts or tools to be plated must be attached to the suspension fixtures in a manner to secure maximum electrical contact and conductivity. Current densities are very heavy in hard chrome plating, and poor contact between the part and its suspension fixture will result in an inferior deposit. When possible, a bolt-and-nut or stud bolt should be used to attach the part to the fixture, then screwed tight to produce solid contact pressure. The fixture should be attached to the part or tool in a manner to avoid current concentrations along sharp edges or through abrupt changes of cross section, and the attachment should be sufficiently rigid to avoid tearing or rupture of the masking material.

When the part or tool has been attached to the suspension fixture, the entire assembly should be given a final cleaning in a standard soap solution operated at about 180°F. This final cleaning removes any surface film carried over from the degreaser, and any dirt deposited during the mounting operation. Only a chemically clean surface will accept the chromium deposit in a manner to obtain maximum results.

Plating procedure

From here on, process manipulations parallel those used in production plating. The part or tool is first given a chromic acid etch in a standard 33 oz./gal. chromic acid solution operated at 130°F. From 1 to 2 amperes of reverse current applied at from 4 to 6 volts d.c. are used to

AMERICAN CHEMICAL PAINT COMPANY
AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet
Subject: PROTECTING FRICTION SURFACES WITH THERMOIL GRANODINE®

INTRODUCTION

Fabricators and product designers, particularly in the automotive field, are aware that even highly polished surfaces under friction weld, gall and score. One of the most inexpensive and practical methods of preventing this is to coat the metal to prevent metal-to-metal contact. With cast iron or steel, the "Thermoil-Granodine" manganese-iron phosphate coating provides a wear-resistant layer of unusual effectiveness.

Thermoil-Granodizing greatly prolongs the life of parts subject to friction. It protects the surface of products like the diesel engine liners shown above and the many moving parts of automobiles and other machines. "Thermoil-Granodine" with its remarkable lubricating properties is particularly valuable in these and similar applications because of its ability to retain oil and maintain lubrication under high pressures and high velocities. This ACP wear-proofing chemical not only permits rapid break-in without scoring, scuffing and welding but also reduces subsequent wear on friction parts.

"THERMOIL-GRANODINE" PROTECTS RUBBING PARTS

Thermoil-Granodizing removes "fuzz" from ferrous metal friction surfaces and produces a coating of non-metallic, water-insoluble manganese-iron phosphate crystals which soak up and hold oil as bare untreated metal cannot do. The oiled crystalline "Thermoil-Granodine" coating on piston rings, pistons, cylinders, cylinder liners, cranks, cam-shafts, gears, tappets, valves, spiders and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, welding, galling and tearing of the metal. The work to be protectively treated is merely Thermoil-Granodized and oiled, usually with a soluble oil.

"THERMOIL-GRANODINE" MEETS THESE SPECIFICATIONS

SPECIFICATION NUMBER	SPECIFICATION TITLE
MIL-C-16232 Type I	Coatings — phosphate; oiled, slushed, or waxed (for ferrous metal surfaces) and phosphate treating compounds.
AN-F-20 (See also U.S.A. 3-213)	Finishes, for electronic equipment.
U.S.A. 57-0-?C Type II, Class A	Finishes, protective, for iron and steel parts.
U.S.A. 51-70-1 Finish 22.02, Class A	Painting and finishing of fire control instruments; general specification for
M-364	Navy aeronautical process specification for compound phosphate rust-proofing process.

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "THERMOIL-GRANODINE" AND ON YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES

etch the low carbon steels, with a slight increase in voltage for high carbon alloys.

After etching, the part or tool is placed in a standard chromium plating solution. Temperature control and concentration of the bath during salvage plating should be as critical as when production plating. When the sulphate content of the bath is low, an objectionably gray deposit will result, while a drop in the chromic acid ration may result in a burned deposit and poor bond. Routine laboratory analysis will indicate when the solution needs additions.

Salvage plating current densities compare with those used in production work. In the neighborhood of 300 amperes are generally used during the first hour, then the current is reduced until plating progresses at the rate of about 0.001-inch plate deposit per hour. It is not advisable to plate very small parts alongside very large parts as the smaller units will be subjected to the greatest current density.

Parts or tools can be removed safely during plating to check them for size and inspect the progress of the deposit. It is also practical to insert unplated parts along with partially plated parts, but this must follow a definite procedure. The unplated part is first suspended in the plating bath and allowed to come to solution temperature. The current is then increased to "start plating" values (200-300 amperes per square foot), but as this current cannot be reversed momentarily for last minute cleaning, the newly inserted work should be transferred to the anode for from 20 to 30 seconds. It is then returned to the cathode bus and plating proceeds in the normal manner.

A stripping bath is very handy in all types of salvage plating work. This bath will serve a double purpose — remove defective deposits so that the part may be re-plated, or it can be used to remove the plating from priorly plated parts which are to be salvage once again. It is not advisable to apply new plate over old. A good stripping bath is composed of a non-critical sodium hydroxide solution operated at about 100°F., and with from 4 to 6 volts of reverse current. This stripping bath has proved highly practical in the shops at Douglas Aircraft Company.

Special techniques for salvage plating

A few "special" techniques are necessary in salvage plating work that need not be observed in repetitive and standard production plating. Cast iron tools or parts, for instance, must be "hit hard" at first to start plating all over at once. Some parts or tools may have deep slots or recesses that require two or three times normal current density to obtain a satisfactory deposit. These hard to hit areas may be effectively plated by reducing anode spacing to approximately 1/16 inch rather than the normal 1/4 inch. In fact, adjustment of anode spacing is often necessary in salvage plating work to obtain even deposits on various tool areas. These deviations from standard procedures are not difficult to forecast, and an experienced electroplater will have

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little trouble in getting the required results.

When final grinding of the chromium deposit is necessary, a softer, somewhat more free-cutting wheel should be used than is employed for grinding hardened tool steel. Aluminum oxide is an excellent abrasive for chromium. The wheel should be as free as possible from iron oxides, and 80 to 100 mesh abrasive will be satisfactory for most work. But whenever practical, edge tools should be sharpened prior to plating. The chromium deposit will maintain this sharpened edge throughout plating, and sharpening will not be necessary after plating.

In summary, it may be said that while salvage chromium plating procedures cannot be standardized due to the variety of sizes and shapes of parts or tools to be rebuilt, the problems involved will not be difficult for experienced plating room personnel. Thorough cleaning is necessary and may require special measures; masking and mounting of the parts will vary but is generally obvious; spacing of the anodes while plating will be indicated by the recesses or grooves that must be plated to the bottom. While hydrogen embrittlement heat treatment should be used on high alloy steel parts, this is no more complex than the heat treatments required when a part is rebuilt by welding. A big advantage of salvage plating is that usually parts are plated to finished dimensions and no work is required on them (heat treatment, grinding, machining, etc.) after they leave the plating department.

While salvage hard chrome plating work received great impetus during the tool shortage area of World War II, the process proved so successful and economical (compared with the cost of replacement parts) that many companies continued this type of work after the war and when tools were again plentiful. Now, with another emergency facing industry, hard chrome plating can be made to serve a purpose in many cases just as satisfactory as complete availability of replacement tools and parts.

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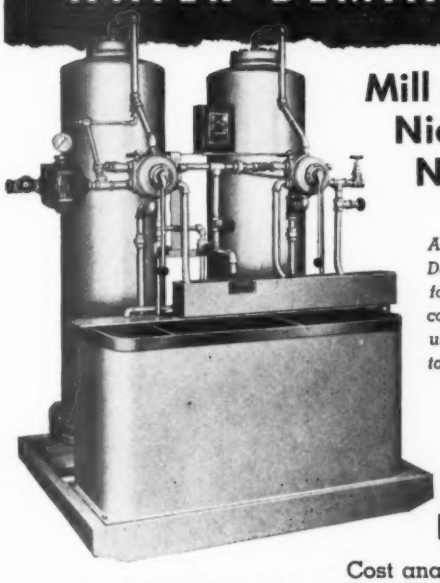

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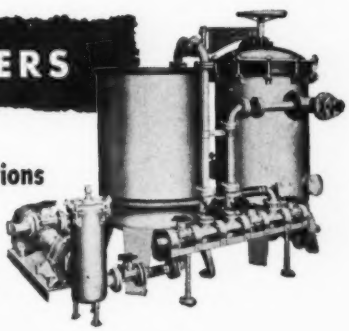

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finish SUGGESTION BOX

New protective cushioning material for interior packaging

highly-resilient material can be made flame-proof, moisture-proof, or highly absorbent — as desired

A NEW protective cushioning material, which meets Federal Specification UU-C-843, has been announced by an Eastern manufacturer.

The producer states that in an independent laboratory test, the newly-developed cushioning material was found to have *four times* the resilience of conventional packing materials.

By varying the manufacturing processes, the producer states that the material can be given any one, or combination, of many important packaging qualities. It can be made either highly absorbent, or non-absorbent and moisture-proof. It can be mildew-proofed and flame-proofed. And, no matter what the manufacturing processing, it is said to be chemically neutral, and thus cannot tarnish, corrode, or otherwise chemically alter any material or products, including fine product finishes.

The new packing material is also an efficient insulator against heat and cold. It is available in any of a number of outer coverings, if desired—paper, tissue, cloth or plastic. For special uses, a tailor-made product can be supplied.

Operation "egg drop"

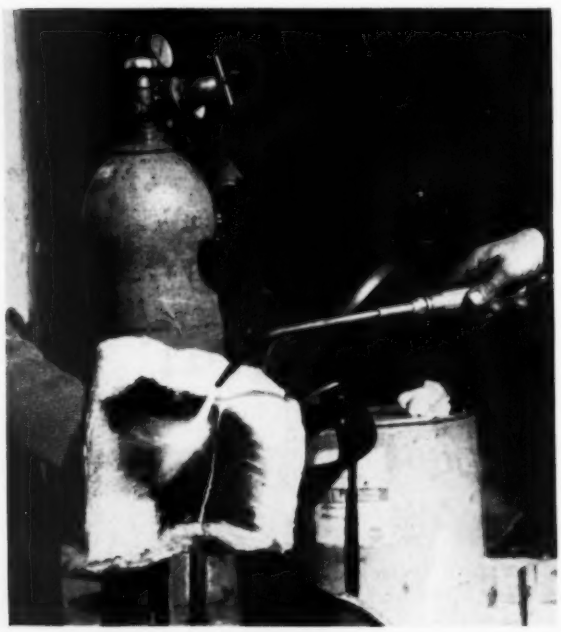
To dramatically illustrate the protective properties of the new cushioning material, a special demonstration was recently conducted, using several dozen raw eggs. The eggs were dropped off a 25-foot high roof, one after the other, onto a double-thick layer of the packing material. Not one of the eggs broke, or even cracked. They merely bounced, unharmed, when they hit the highly resilient cushioning material, it was stated.

Dropped from a height of 25 feet, this egg did not break—just bounced.

The absorbent types are said to be ideal for protecting the fine finishes of home appliances and furniture. The non-absorbent types are said to be ideal for packing radio tubes and other delicate products, and heavy equipment, as well as for export packaging.

The material is said to exceed Federal Specification UU-C-843 for cushioning material (both absorbent and non-absorbent types) and Military Specification MIL-F-5030 for mildew-proofing (when so processed).

It is reported that the U.S. Air Force and Signal Corps are already using millions of feet of the new material for packaging. Perhaps the most exacting use is in the packing of radar, range-finding, and other delicate equipment for parachute drops.



A pad of the cushioning material is held by one man in the palm of his hand while another person plays the flame of an acetylene torch on it. Although the heat of the flame was about 2000° F., the material was charred for only a small fraction of its thickness. The bare hand holding the pad felt only a little heat.

Source for more information on this highly-resilient packaging material may be obtained by writing to *finish*.

April · 1952
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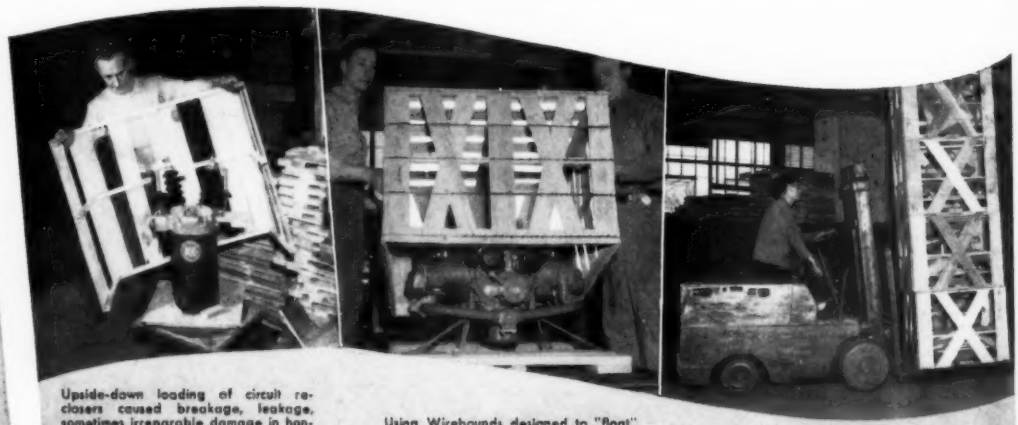
Losses due to container failure have no place in an industrial economy facing material allocations and shortages. That's why you should investigate *Wirebounds* —which combine the strength of steel with thinner wood to bring you *better product protection at lower cost.* Three hundred graduate engineers of the Wirebound Institute have been technically trained to design tailor-made *Wirebounds* which assure damage-free product delivery. The value of this container engineering is clearly demonstrated in the following case histories. We will be glad to show you how these benefits apply to *your* product. Use the coupon below.

YOU CAN CUT DAMAGE CLAIMS LIKE THIS:



Upside-down loading of circuit reclosers caused breakage, leakage, sometimes irreparable damage in handling and transit. Since switching to Wirebounds, company reports damage claims have become negligible.

Using Wirebounds designed to "float" 400 lb. precision engines, this manufacturer chalked up a record of 3000 shipments in fifteen months without a single instance of damage in transit due to container failure.

Flexible power saw maker reduced shipping weight from 820 to 775 pounds, cut crating time 30%. Company stacks and handles units four high. Shipping damage due to container failure has been completely eliminated.

choose your course of action...

Wirebound
BOXES & CRATES

☐ Send me general information . . . complete descriptive book titled "What to Expect from Wirebounds."

☐ Send me specific information . . . tear sheets of case histories of packing products similar to mine.

☐ Give me direct action send an Institute trained sales engineer to show the advantages of Wirebound packing for my own product.

NAME POSITION

FIRM

STREET AND NUMBER

CITY ZONE STATE

OUR PRODUCT IS IT WEIGHS

Users names on request

mail now to WIREBOUND BOX MANUFACTURERS ASSOC.
Room 1154—327 South LaSalle Street, Chicago 4, Illinois

safe transit

A monthly trade publication section devoted to improved packaging and shipping and materials handling practices in the home appliance and allied metal products field.

Plant experience information for all executives and plant men interested in the problem of packaging and shipping improvement and loss prevention.

Complete information on the National Safe Transit pre-shipment testing program for packaged finished products, and detailed progress reports of divisions and sub-committees of the National Safe Transit Committee.

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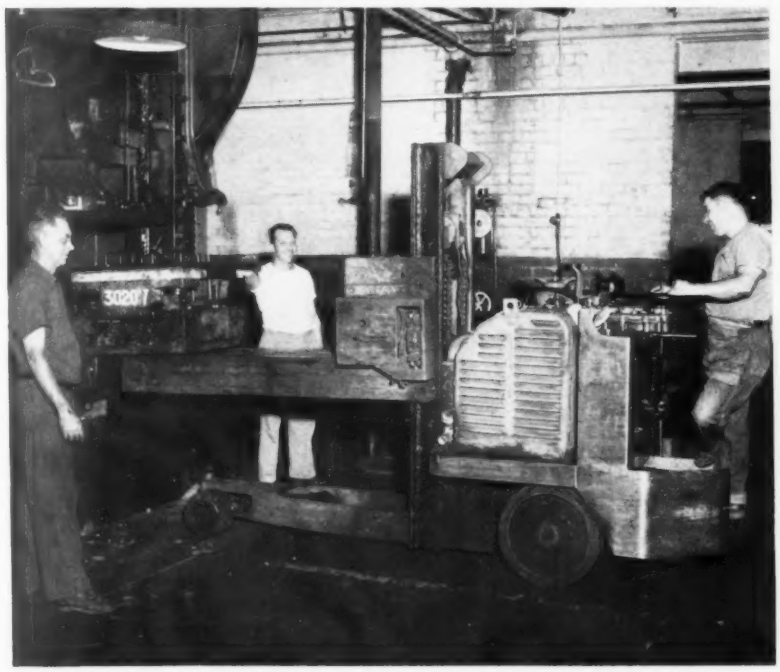
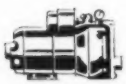
Youngstown Kitchens products *— are packed in cartons prior to shipment to distributors and dealers from Mullins Plant 3. The cartons are tape-sealed further down the line at the right.*

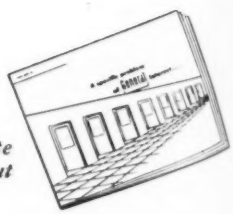
Changing dies *— can be a difficult project. At Plant 3, however, a lift truck with a special attachment accomplished the task with ease.* *(See photo story of production operations on Pages 22 and 23.)*



your competition may be MORE than one jump ahead if you make these products: kitchen ranges • water heaters • regulators • refrigerator units • pumps • motors



Our packaging engineers have just designed new and different containers for *each* of these products. They are lightweight and extra strong! They are *designed* to cut packing and shipping costs, to speed production! They are good looking, too! We have experience in designing better shipping containers for practically all types of products. Write us. Get the facts on this important subject.



Get this important booklet. Write today! It's free! It shows how to cut packing and shipping costs.

ALL TYPES OF ENGINEERED SHIPPING CONTAINERS

District Offices and Plants:
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General Wirebound Crate
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General Corrugated Box
General Cleated Corrugated Container
General All-Bound Box
Generalift Pallet and Pallet Box
General Watkins-Type Box

ST-4

Perfect Shipping campaign stresses careful switching

this article, written for railway employee magazines (45 in number), should be of interest to every shipper of a finished metal product

THE month of April holds special significance for every railroader who works with freight and freight equipment. For April is the month of "*Perfect Shipping*", the time when we take stock of what has been done and what still needs to be done to make shipments safer for transportation — and to make transportation safer for shipments.

This April marks the 16th annual campaign in which railroaders, shippers and others concerned with transportation pool their efforts in trying to achieve perfect shipping. Shippers themselves, organized and working through the 13 regional Shippers Advisory Boards and the national association of those boards, will be bringing home to railroad customers the importance of safe packaging, correct and complete addressing, and safe handling, loading and bracing of shipments.

In short, shippers everywhere will be trying to further perfect shipping by making shipments safer than ever for transportation.

Safe transportation for shipments

But what about making transportation safer for shipments?

That's where every railroader who has anything to do with freight handling can help. It's not enough that goods are packed, marked, loaded and braced in the best possible manner. It's just as important that shipments and the freight cars that move these shipments across the country be handled as though each were loaded with eggs — handled safely and without damage from origin to destination.

Safe handling: This is the end of the Perfect Shipping campaign that the railroad worker himself has to hold up. He is an indispensable part of the Perfect Shipping team, a vital link in the distribution chain that extends from manufacturers to customers.

The careful worker knows that freight damage is a thief that robs us all of useable goods; at the same time, it drains off railroad revenues, loses railroad customers and undermines railroad jobs. That's true because railroads, in selling transportation service, must please their customers. If shippers do not like the way railroads handle the goods they are entrusted with moving, their business simply goes somewhere else. And less business means less revenue

and fewer jobs. That's why no one—neither railroads nor workers nor the nation — can afford freight loss and damage. It's up to everyone to help stop them before they happen.

Watch those coupling speeds!

How can railroad workers help make transportation safer for shipments? There are many ways, but the most important of all is: Watch those *coupling speeds* in switching cars! High impact speed is the No. 1 hazard when it comes to causing damage in switching, and rough handling of cars is one of the biggest single causes of all damage to freight.

By improving plant and operating methods, the railroads themselves are doing their utmost to make shipping safer. In spite of material and money shortages, they are placing into service more shock-resistant freight cars, installing new yard facilities, improving tracks and all other parts of their plant. But in the end, it is the men who operate this safer plant who can contribute the most toward taking the damaging shocks out of transportation.

The square of the speed = increased damage probability

In switching cars, the force with which cars couple together mounts by leaps and bounds as striking speed increases. So does the damage to whatever is loaded within the cars. When cars come together at 8 miles per hour, for instance, the impact is *16 times* that of coupling at 4 miles per hour and *64 times* that of 1 mile per hour. The forces causing damage increase far out of proportion to a simple unit increase in speed.

What is a *safe* coupling speed? Tests with impact recorders show that for average commodities, couplings of up to 4 miles per hour cause little or no damage. Certain loads, however, cannot be coupled at even that speed without sustaining extensive damage. It is also a well-known rule that cars placarded "explosives" must not be cut off at all in switching, nor should other switched cars be allowed to strike them.

With these variations in requirements, the good judgment of experienced railroaders engaged in switching is obviously the best guarantee of all of what safe coupling speed should be for particular carloads. But if all cars are coupled consistently at less than 4 miles an hour, a long and important step will have been taken toward eliminating a cause for a lot of freight damage. Such speed is about the pace of a brisk walk. Let's remember that from this speed on, the amount of damage resulting from hard couplings shoots straight upward.

For April and the year 'round

There is another timely reason for giving new attention to careful switching in April besides the fact that it's the month of Perfect Shipping. April marks a quickening of the turn toward warmer weather. And warmer weather means that cars roll more freely — and couple with greater impact. Fully twice as many overspeed impacts occur in summer as in winter.

So, this April, as well as this summer and all the year 'round, let's watch those high-speed couplings. Let's all hold up the railroad end of making Perfect Shipping a reality.

Perfect Shipping Letters

To Finish:

As per our phone conversation, here is enclosed a complete kit of information on the 16th Annual Campaign sponsored by the National Association of Shippers Advisory Boards and conducted, so far as shippers and receivers are concerned, by the 13 regional Shippers Advisory Boards comprising some 25,000 of the larger shippers and receivers throughout the country.

The railroads are taking part in this campaign by organizing a special effort throughout the month of April to reduce damage to freight and equipment caused by heavy switching impacts.

There is enclosed a copy of an article written for railway employee' magazines published by about 45 railroads; copies of (a) the general campaign poster which is offered for posting in shipping and receiving rooms, freight stations, etc.; (b) a leaflet which will be widely distributed among shippers and receivers; (c) a poster of which 50,000 have been printed which

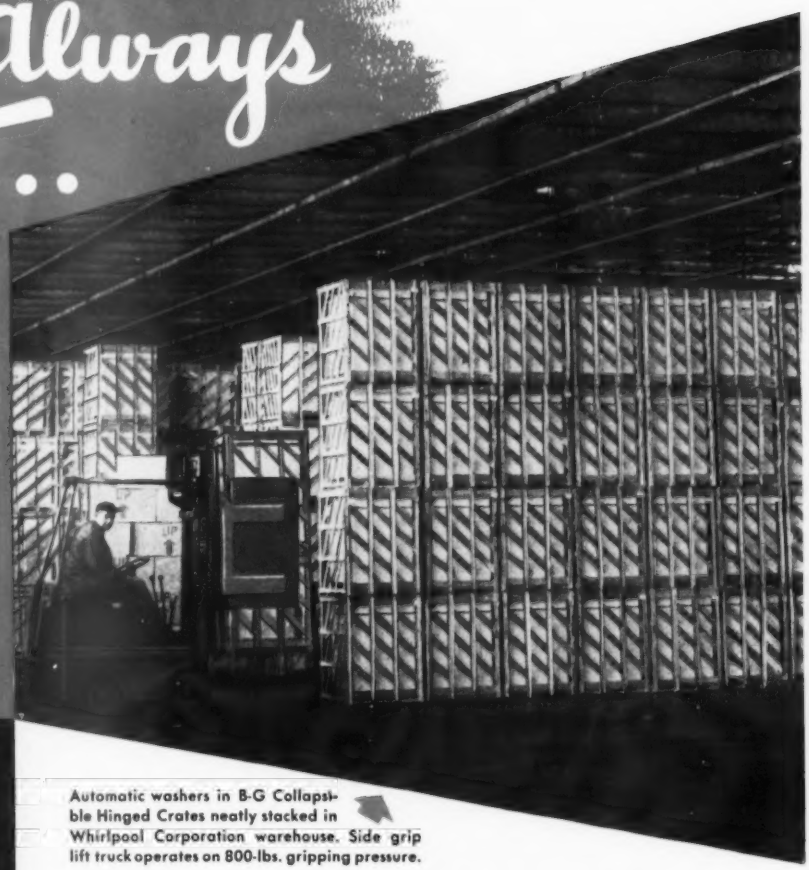
to Page ST-14 →

You're Always Right...

IN USING

BIGELOW GARVEY

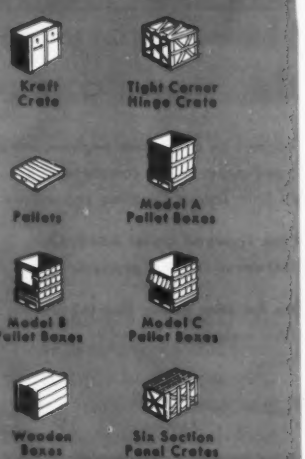
COLLAPSIBLE TIGHT-CORNER CONTAINERS



Automatic washers in B-G Collapsible Hinged Crates neatly stacked in Whirlpool Corporation warehouse. Side grip lift truck operates on 800-lbs. gripping pressure.

30 YEARS EXPERIENCE

Bigelow-Garvey's many years of experience in packaging engineering assure you the right shipping container for your individual requirements.



B-G Tight-Corner Collapsible Hinged Containers and Pallet Boxes are Profit Items for you in your shipping and handling program, when you consider the safety of your product, the time saved and the steadily rising labor costs.

- B-G Tight-Corner Containers are individually engineered to carry your product safely.
- B-G Crates and Boxes assure sharp reduction in packing time.
- B-G Containers come 65% assembled. Pre-drilled nail holes save assembly time.
- B-G Products have built-in strength. Permits heavy duty stacking.
- B-G Tight-Corner Crates and Boxes are built to withstand transit hazards. Assure safe delivery.
- B-G Containers are laboratory tested for strength. Meet National safe transit specifications.
- B-G Collapsible Containers and Pallet Boxes are the final answer to your shipping, handling and storage problems.

Let your shipping problems—whether for defense or civilian products—be ours.

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B G

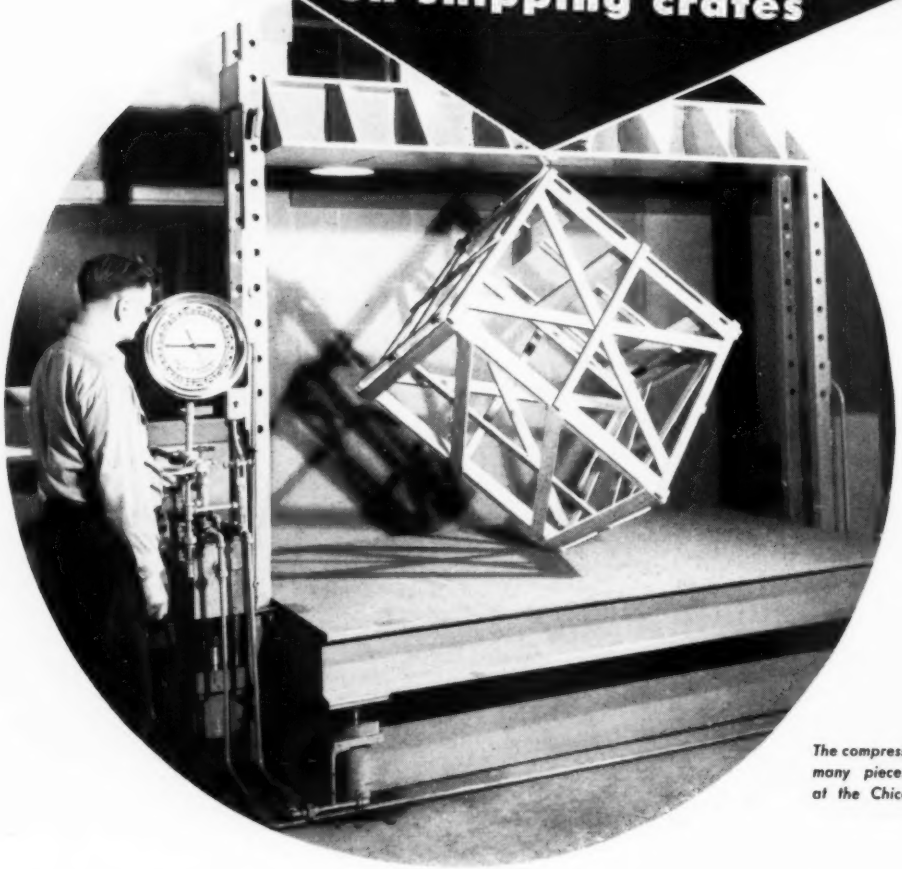
General Office and Laboratory

Write for complete details and prices to...

BIGELOW-GARVEY lumber company

320 W. HURON STREET • CHICAGO 10, ILLINOIS

putting the pressure on shipping crates



The compression tester—one of the many pieces of test equipment at the Chicago Mill Laboratory.

The "Chicago Mill and Lumber Laboratory Tests" Pre-Prove Your Crates and Boxes

Wirebound,
Nailed or Hinge Corner
Cleated Plywood
Cleated Craveneer
Cleated Corrugated
Shop and Tote Boxes
Woodsteel Nesting Boxes
*
FOR DOMESTIC OR EXPORT
FOR PEACE OR DEFENSE

Chicago Mill crates or boxes are properly designed by competent engineers to deliver your product safely—and—they have been pre-proved in a completely equipped and staffed laboratory, *a National Safe Transit Certified Laboratory.*

Chicago Mill is the *only* single source for all the types of crates listed. Our engineers will recommend the type of crate best suited for *your product.*

Technical service, packing information and the facilities of our fine laboratory are available without obligation to all Chicago Mill customers. Ask for information on this free, cooperative service.

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Tallulah, Louisiana • South Fork, Colorado • Chicago, Illinois

A practical pre-shipment test for carload shipping

how Westinghouse tests carload shipments of major home appliances to reduce in-transit damage to an absolute minimum

by J. K. Linsenmayer • SUPERVISOR, SHIPPING DEPARTMENT, AND *P. W. Bush* SUPERVISOR, QUALITY ANALYSIS LABS., WESTINGHOUSE ELECTRIC • CORP., MANSFIELD, O.

This photo shows a typical test set-up in the railroad yards. The test in this photo involved two cars which were those directly attached to the locomotive; however, the tests were conducted individually on each car. Tests are usually made with two or three cars to save time in moving to and from the yards. In this set-up, the coal car shown was part of the group of 20 stationary cars in the test to which the test cars were coupled at various speeds.

Exclusive feature finish

Consider a loaded freight car as one complete "packaged product" being shipped from the manufacturer to its ultimate destination. Westinghouse has for many years considered "packaged products" in two categories:

1. Major electrical appliances such as ranges, refrigerators, laundromats and small appliances combined with the necessary packing and container as a "packaged product."
2. A transportation conveyance such as a freight car loaded with these packaged products plus the necessary carloading and blocking as one giant "packaged product."

The foremost question in either case is: Will the product itself arrive at its ultimate destination in a satisfactory condition? Many years of experience has shown this can be determined by a pre-shipment testing program, which may be in two separate steps; that is, tests applied to both categories as above outlined in Nos. 1 and 2.

The National Safe Transit testing program, as prescribed for packaged products up to 1000 lbs., provides a sound and practical answer to the first category. The next step then becomes obvious; that is, a standard pre-shipment test for carload shipments. It should be remembered that conditions within the freight car are such that terrific crushing force is imposed on the various packaged products loaded in the car depending on the position, weight, etc., and the way the car is handled.

The National Safe Transit tests on the individual packaged product

cover very thoroughly the conditions from the manufacturer to the freight car, and also from the freight car to its ultimate destination. However, it is practically impossible for pre-shipment tests for packaged products to take into consideration the crushing forces which may be encountered in the car while in transit.

The giant impact tester

Visualizing the loaded freight car as one giant "packaged product," it becomes subjected in testing to what might be termed a giant Conbur test. This can be accomplished in the railroad yards with the aid of a switch engine pushing the car and permitting the individual freight car to roll against a backstop of other freight cars. This provides a test with the crushing force as it actually exists within the car during car switching.

The purpose of this article is to show *test methods* only — with no particular emphasis on methods of loading, blocking, and strapping.

A *standard* method of test has been developed so that results may be evaluated. This involves the following requirements;

1. A test specimen — freight car loaded and blocked by established standard loading practices.
2. Method to evaluate shocks or car speed by instrumentation or time measurement.
3. The test set up in the railroad yards.
4. A standard method of testing.

Let's consider a car of automatic washers loaded and blocked by established loading practices, such as shown by the Loading Diagram. This car, of course, is inspected by our shipping inspector in the regular manner prior to shipment. The car is now ready to be moved into the railroad yards for testing.

Table of Measurement for Impact
(Using Shock Recorder)

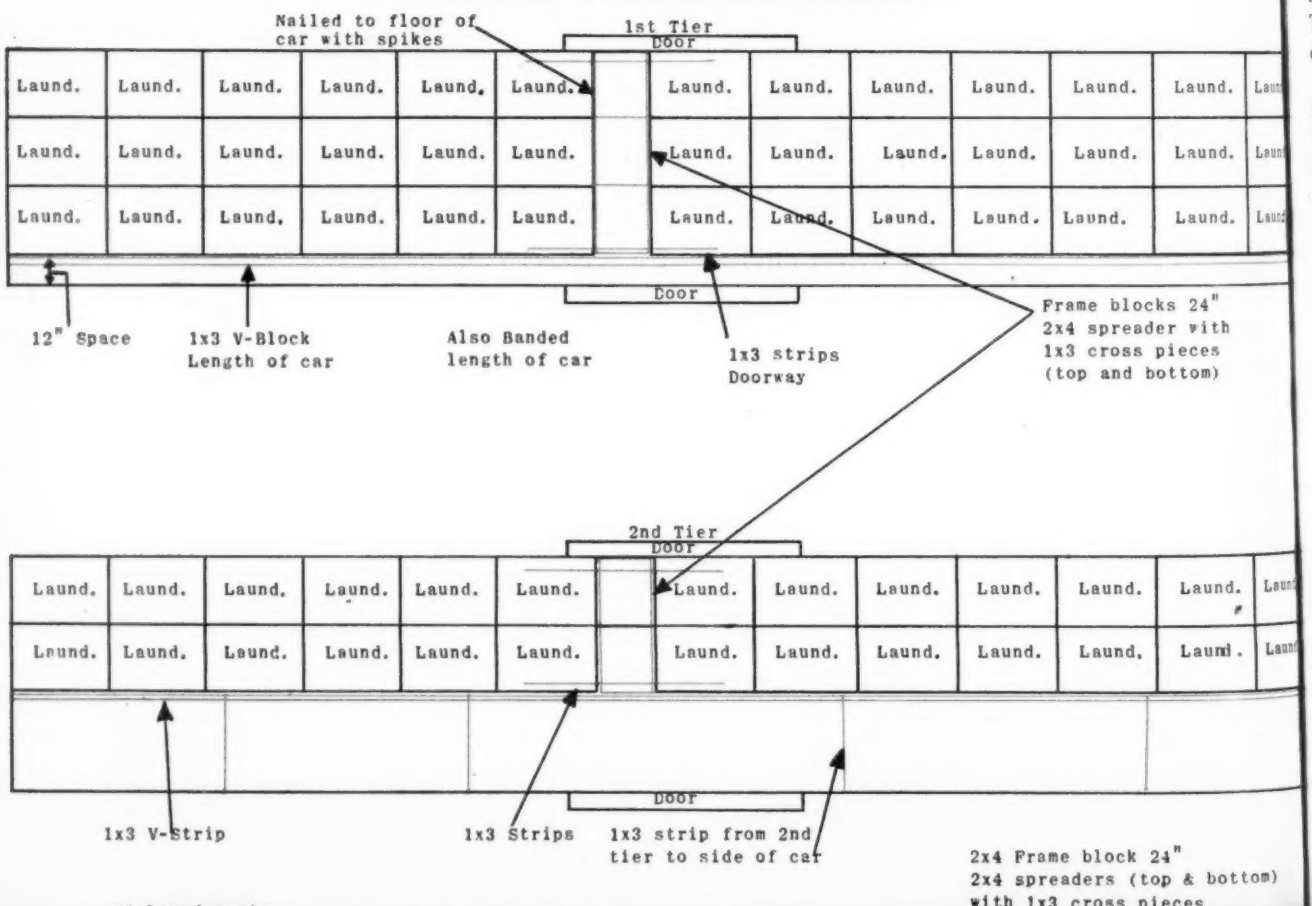
Zone of Shock	*Miles Per Hour*	*Railroad Acceptance Rating*
Zones 1 and first half of Zone 2	3 to 4	Normal handling
Second half of Zone 2	5	Borderline
First half of Zone 3	6	Rough handling
Second half of Zone 3	7	Rough handling
First half of Zone 4	8	Rough handling
Second half of Zone 4	9	Rough handling
First half of Zone 5	10	Extremely rough handling
Second half of Zone 5	11 - 12	Extremely rough handling

Note: Not to be confused with zone specifications *accumulative on conbur* for individual PACKAGED PRODUCTS where very crushing force is involved.

Measurement of speed at time of impact

Two methods are normally employed to accurately determine the speed at the time of impact of the car in test to the stationary cars. The instrument commonly known as the shock recorder may be used. This records on a continuous tape the shock which may be converted into

Solid Car of Automatic Washers


Nailed to floor of car with spikes
1st Tier
Door
Laund.
12" Space
1x3 V-Block Length of car
Also Banded length of car
Door
1x3 strips Doorway
Frame blocks 24" 2x4 spreader with 1x3 cross pieces (top and bottom)
2nd Tier
Door
1x3 V-Strip
1x3 Strips
1x3 strip from 2nd tier to side of car
Door
2x4 Frame block 24" 2x4 spreaders (top & bottom) with 1x3 cross pieces

Movie cameras being used to photograph interior of car at time of impact.

miles per hour using a table commonly used by the railroads.

Another method also used by many railroads consists of placing two torpedoes 40 ft. apart on the railroad track, directly in the line of test, and using a stop-watch and a table of measurement for impact.

These two methods have both been used separately, or together for a double check if desired, although either one has been found suitable. This enables the shipper to easily determine speed at time of impact.

Further benefit may be obtained if slow motion movies are made of the test. Study of these movies shows the movement at the time of impact, and from this data much can be gained in development of protective measures. In addition to this, it is especially valuable to photograph the car's interior *before and after* each test to provide a record of exactly what happens.

Test methods

As we proceed with the test procedure, let us assume the car is in the railroad yards on the siding, a switch engine is available and a group of two or more cars in a stationary position on the siding.

The standard test is divided into four tests.

1. Impacts at 4 to 5 miles per hour
2. Impacts at 6 to 7 miles per hour
3. Impacts at 8 to 9 miles per hour
4. Impacts at 10 to 11 miles per hour.

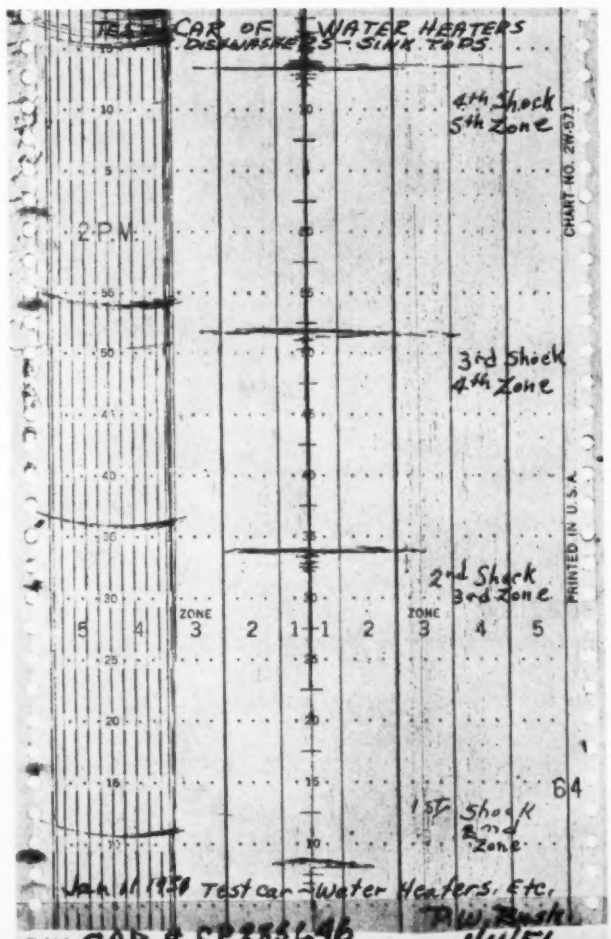
The standard test procedure:

1. The switch engine moves the car in test to a position sufficiently far from the group of stationary cars for the test, with the shock recorder properly set or torpedoes on the track in the line of run. The car is then moved in the normal manner by the switch engine towards the group of stationary cars. Upon reaching the speed sufficient to provide an impact at approximately 4 to 5 miles per hour, it is released, allowing only the test car to move against and be coupled to group of stationary cars.

Immediately after the impact, the interior of the car is inspected to determine the condition. If any damage is found, it is normal procedure not to proceed further with the test but to immediately determine the cause and incorporate corrections in the next test car. This minimizes the possibility of damage occurring during test which might result in expensive repairs, thus keeping the cost of tests at a minimum.

Before proceeding with the next portion of the test, it is necessary to advance the shock recorder tape, if using a shock recorder, or place new torpedoes on the track in case that method is used.

2. The second portion of the test is a repetition of the first, except the speed is increased to produce impacts at approximately 6 to 7 miles per hour with the same inspection procedures following the test.



On the right is shown a photo of the tape taken from a shock recorder installed in a car of water heaters and dishwashers.

Instrument commonly known as a shock recorder is shown mounted in car.

3. The third portion of the test again repeats the No. 1 procedure, except the speed is increased to provide an impact at 8 to 9 miles per hour, and repeating inspection procedure.

4. The fourth and final portion of the test again repeats No. 1, except the speed is increased to provide impacts at 10 to 11 miles per hour.

These four completed tests constitute the test cycle for preshipment test on carload shipments.

Direct benefits of carload testing

The foregoing tests provide a safety factor of over double of what is commonly rough handling by the railroads. How much benefit that is derived will depend on the follow-up and action taken to make any corrections that show up unsatisfactory during these tests.

Westinghouse, in order to accurately determine the condition of the packaged products as they arrive at the distributors, uses a monthly report form. This provides a double check on the tests.

This report shows the total quantity of:

1. *products received*
2. *damaged containers*
3. *damaged products*

In this manner, a more accurate check can be kept on the exact amount of products received damaged, and from this the percentage determined of each district. We can not reduce our transportation losses to the lowest overall level without these reports. Their use is to show each district where high losses are found and then that location is to do something to reduce their losses. This report shows that if the overall average for the nation is at a low level and if any location or distributor has high losses, the cause of these high losses is definitely due to rough handling in the district by the carrier or in their own warehouse.

Locations that have consistently shown high damage have been brought in control with the aid of this testing program, together with the monthly follow-up of reports. It should be remembered, this monthly report shows on a basis of comparison those with high damage based on the national average.

From this overall program of preshipment testing of carload shipments, Westinghouse has been able to reduce in-transit damage a substantial amount beyond that accomplished by the regular National Safe Transit tests which are conducted daily on the individual *packaged product*. This points out how these test procedures combined with the regular National Safe Transit tests on individual *packaged products* provide a test program which will bring in-transit losses to the absolute minimum.

Acknowledgment

Special recognition is given to the Pennsylvania Railroad for their splendid cooperation in conducting these tests. This points out their recognition of the value of these tests, resulting in an ultimate further reduction of shipping losses, which in turn reduces claim payments.

Table of Measurement for Impact

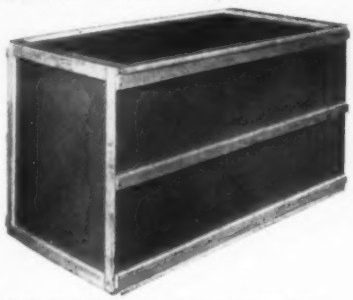
(Using Stop Watch and Torpedoes)

40-Foot Course

Time (In Sec.)	*M.P.H.*	*Time* (In Sec.)	*M.P.H.*	*Time* (In Sec.)	*M.P.H.*	*Time* (In Sec.)	*M.P.H.*
2.0	13.63	4.1	6.65	6.2	4.40	8.3	3.29
2.1	12.99	4.2	6.49	6.3	4.33	8.4	3.25
2.2	12.40	4.3	6.34	6.4	4.26	8.5	3.21
2.3	11.66	4.4	6.20	6.5	4.20	8.6	3.17
2.4	11.36	4.5	6.06	6.6	4.13	8.7	3.13
2.5	10.91	4.6	5.93	6.7	4.07	8.8	3.10
2.6	10.49	4.7	5.80	6.8	4.01	8.9	3.06
2.7	10.10	4.8	5.68	6.9	3.95	9.0	3.03
2.8	9.74	4.9	5.57	7.0	3.90	9.1	3.00
2.9	9.40	5.0	5.45	7.1	3.84	9.2	2.96
3.0	9.09	5.1	5.35	7.2	3.79	9.3	2.93
3.1	8.80	5.2	5.24	7.3	3.74	9.4	2.90
3.2	8.52	5.3	5.15	7.4	3.69	9.5	2.87
3.3	8.26	5.4	5.05	7.5	3.64	9.6	2.84
3.4	8.02	5.5	4.96	7.6	3.59	9.7	2.81
3.5	7.79	5.6	4.87	7.7	3.54	9.8	2.78
3.6	7.58	5.7	4.78	7.8	3.50	9.9	2.75
3.7	7.37	5.8	4.70	7.9	3.45	10.0	2.72
3.8	7.18	5.9	4.62	8.0	3.41		
3.9	6.99	6.0	4.55	8.1	3.37		
4.0	6.82	6.1	4.47	8.2	3.33		

New American Wirebound is 4-in-one Combination

Minimum size, most protective, quickest and easiest to pack and unpack are features of this wirebound crate by American Box, for shipping a bowl, seat, tank and cover combination, without accessory-packs. Intermediate B-B cleats, permit shipping the bowl and tank only—omitting the cover or seat, or both, if desired—without altering the crate. Manufacturers of vitreous and cast iron sanitary ware acclaim this new American Wirebound Crate as finest in the field. Details on request.



Slash Panel Costs at American Box with New Machinery Development

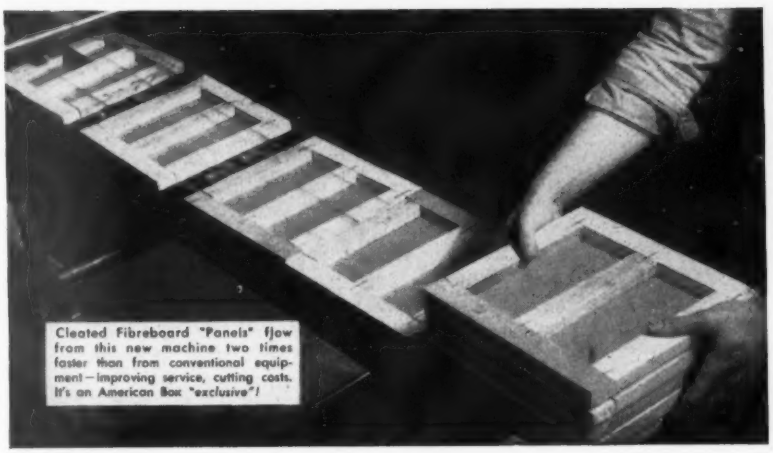
Users of cleated panel boxes reap the benefits of sizeable cost reductions made possible by special machinery engineered at American Box, now producing panels at twice the speed of conventional equipment. Improved quality and service at substantial savings are enabling many more classifications of shipping to use "panel" boxes for the first time. Send for Bulletin, "Effective Cover for your Shipments".

Gas Furnace and Dryer Travel Safer in American "Pressure-Pack" Wirebounds

"Concealed" damage is eliminated by these new, open-type wirebound crates "centric pressure-packed" by American Box for greater protection, convenience and economy. Paper cover is optional. "Pressure-packing" the base, guards the rest of the unit from harmful contacts. "Palletizing" simplifies handling of 400-lb. furnace. Wrap-around assembly is quick, easy. Twist-type closures are sealed, tamper-proof. Ask for complete details.

51 YEARS OF BETTER BOXES—"THE *American* WAY"

DOWN GO COSTS at AMERICAN BOX



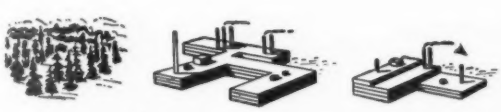
Cleated Fibreboard "Panels" flow from this new machine two times faster than from conventional equipment—improving service, cutting costs. It's an American Box "exclusive"!

3 new machinery developments give American customers best buys

Modern machinery engineering at **American Box** cracks down on inflation! We "scooped" the entire field with the **world's fastest panel machine,** developed in our own plant—an **American Box "exclusive."** It **doubles** production of cleated panel boxes—cuts manhours to the bone. New heavy-duty wirebound machinery and new automatic sawing machinery work wonders in our wirebound and nailed wood box production. The **better quality, faster service** and **lower prices** are passed on to **you!** Make us **prove** it. Compare "quotes" now!

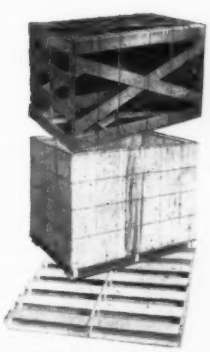
Timber Tracts and Two Great Plants (Est. 1901)

Thousands of acres of company-owned timber supplying veneers to our plants conveniently located in Cleveland, Ohio, and Marion, South Carolina.

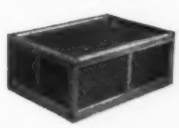


THE *American* BOX CO.

1902 W. 3RD ST. CLEVELAND 13, OHIO • MARION, SOUTH CAROLINA



American Wirebound Crate, Tote Box, Pallet



American Fibreboard Box

American Nailed Wood Box

ST-13

SIGNODE STRAPPED PALLET WINS STOLLER AWARD!

Shown are two examples of W. E. Christopherson's better packaging method which won the Irving J. Stoller Special Award at the 1951 SIMPMHE Convention.

Weight, shipping charges reduced 19%... materials, labor costs, 72%

Strapped pallets answered a packaging puzzle that confronted W. E. Christopherson, Supervisor of Packaging and Crating, Douglas Aircraft Company, Santa Monica, California.

Fire prevention kits for aircraft, valued at $4,748.00 each, formerly were packaged in four-carton units. These were repacked in a heavy wooden box and Signode steel strapping applied. Weight and packaging costs were too high.

Mr. Christopherson had a new idea. Components of each kit were put directly into the cartons—all 4,430 pieces—already inspected and packaged. Now, each kit of 4 cartons was stacked on a sturdy, disposable pallet, bound together in a single unit with Signode steel strapping.

Saves weight, time, money

Weight dropped 73 pounds! Labor and material costs per unit dropped $11.83! Total savings per box shipped by freight were $21.16 per unit! 605 kits were shipped by the new method of packaging. At savings per kit of $21.16, total savings amounted to $12,801.80!

Palletize for Profit Yourself!

If you want to know how improved methods of palletizing can cut your packaging, handling and shipping costs, ask to have an experienced Signode field man call on you. Signode perfected many of the most widely used palletizing methods.

SIGNODE STEEL STRAPPING COMPANY
2639 N. Western Ave. Chicago 47, Illinois
this seal means security in shipping

SIGNODE

Offices Coast to Coast
In Canada: Canadian Steel Strapping Co., Ltd.
Foreign Subsidiaries and Distributors World Wide

→ *from Page ST-6*

will go up in conspicuous places in yards and terminals where switching is done; and (d) a leaflet of which 120,000 have been run which will be given to every man directly concerned with switching.

This campaign embraces all railroads belonging to the Association of American Railroads; all railroads belonging to the American Short Line Association; and all railroads operating in Canada.

The campaign to improve switching practices is described in Bulletin No. 1130 which is supported by Vice President J. H. Aydelott's circular letter to chief operating officers, member roads, dated February 19, 1952.

The cartoon, "Perfect Shipping Pays Off," by Jim Berryman, celebrated cartoonist of the *Washington Star*, is being distributed to all railway magazines as well as to a number of trade journals.

For your information, it is estimated that the total amount of claims paid by U. S. and Canadian railroads for the year, 1951 (three months partly estimated) was approximately 99 million dollars, an increase of 11.3% compared with 1950.

Since July, 1951, however, there has been a steady reduction in the number of claims presented by the shipping public which may justify the prediction that the railroads are "over the hump;" and there should be some reduction both in the number of claims presented and in the amounts paid, thereon, for this year.

A. L. Green
Special Representative
Freight Claim Division
Association of American Railroads
Chicago 5, Illinois

ASSOCIATION OF AMERICAN RAILROADS
Operations and Maintenance Department
Washington 6, D. C.

To chief operating officers, member roads:

There is transmitted to you herewith a copy of circular letter addressed to Freight Claim and Prevention Officers by the National Freight Loss and Damage Prevention Committee, together with printed material concerning the April Perfect Shipping Campaign.

It will be noted that particular attention will be directed in the campaign to the elimination of rough handling of cars in switching movement, and this for the reason that much of the unlocated damage and concealed damage is thought to be due to over-speed couplings, either singly or in combination with improper packaging, loading and bracing or perhaps a car which is below average condition for the commodity handled.

The nation-wide cooperation of shippers has been assured through action of the National and Regional Shippers Advisory Boards, the 1952 program being the 16th one in which they have joined the carriers in this special effort to reduce freight loss and damage.

Both the railroads and the shippers in the past year have acquired new people having responsibilities in the handling of L.C.L. and carload freight, all of whom as well as experienced forces should profit from the educational features of this yearly campaign. It is hoped that the printed material and placard will be found helpful to each railroad in the preparation of its own program. Your cooperation will insure the success of the national program.

J. H. Aydelott
Vice President

WIREBOUND BOX MFRS. MEET IN SAN FRANCISCO

Joseph A. Sowell (right), newly-elected president of Association, receives the congratulations of his predecessor, A. L. Whiton.

The revelation that the wirebound shipping container industry had joined the "$100,000,000 Club" of American industries was made at the annual meeting of the Wirebound Box Manufacturers Association, held at the St. Francis Hotel, San Francisco, Feb. 26 and 27.

L. S. Beale, Association secretary, stated that the industry's volume of business in 1951 was $108,245,767, the first time that it had reached or exceeded the $100,000,000 mark.

The wirebound shipping container industry, over 85 per cent of whose production is represented by member companies of the WBMA, manufactures scientifically engineered wirebound crates and boxes for industrial products, and food products.

In all categories, Beale reported, the 1951 production exceeded that of the previous year. The total number of wirebound boxes and crates manufactured in 1951 were 176,061,929, including 36,474,957 for general industrial products. Total unit production of wirebound shipping containers in 1951 was 11.4 per cent over the number produced the preceding year.

New government specifications for the packing of defense goods for shipment, both domestic and export, and a strong trend throughout the fresh fruit and vegetable industry for more modern and more scientifically engineered shipping containers for perishable commodities indicate, Beale and other speakers agreed, that the wirebound shipping container industry will continue to expand at a healthy rate.

Joseph A. Sowell, of T. R. Miller Mill Co., Brewton, Alabama, a participant in the wirebound shipping container industry for 27 years, was elected president of the Association. He succeeds A. L. Whiton, of Chicago Mill and Lumber Co.

Jasper A. Cragwall, of Kansas City; Warren F. Myers, of San Francisco; Foster L. Martin, of Clarksburg, W. Va.; Jess A. McGill, of Paris, Texas; and George H. Kubes, of Cleveland, were newly elected to the board. Directors reelected are Whiton; J. B. Adkins, of Gainesville, Fla.; E. S. Barnhill, of Indianapolis; L. O. Crosby, Jr., of Picayune, Miss.; F. J. Martin, Jr., of Toledo; R. F. Miles of Chicago; John R. Miller, Jr., of Brewton, Ala.; Shelley Schuster, of New Orleans, and D. R. Simmons of Bainbridge, Ga.

BRYANT HEATER, FLORENCE STOVE, BEAM MFG. CERTIFIED BY SAFE TRANSIT COMMITTEE

The National Safe Transit Committee has announced the certification of the following companies: *Bryant Heater Division*, Affiliated Gas Equipment, Inc., Cleveland, Ohio; *Florence Stove Company*, Lewisburg, Tennessee; and *Beam Manufacturing Company*, Division of Solar Corporation, Webster City, Iowa.

These certifications bring to 97 the number of manufacturers cooperating in the National Safe Transit Program. Manufacturers desiring further information on the NST program should write to the National Safe Transit Committee, 1010 Vermont Avenue, N.W., Washington 5, D. C.

CHICAGO MILL RETIRES THREE, GERLACH NAMED PRESIDENT

At a board of directors meeting, March 12, Chicago Mill and Lumber Company, announced the retirements of F. W. Schatz, president, J. F. Griswold, chairman, and Charles F. Wiedeman, treasurer. Wiedeman had a record of 64 years of service with the company.

The directors also elected the following new officers: Charles W. Ger-

Charles F. Gerlach (left), newly-elected president of Chicago Mill, is shown with Charles F. Wiedeman, F. W. Schatz, and J. F. Griswold.

finishfoto

lach, president; J. H. Dunn, executive vice president; L. B. Buchanan, vice president and controller; L. A. Mizener, vice president; R. N. Ware, Jr., vice president; E. F. Spongberg, secretary; and A. L. Grey, treasurer.

Although retired from active management, J. F. Griswold, chairman, will continue to consult with the active officers.

NST MAIL BAG

savings have paid for testing expenses

To Finish:

In reply to your letter, we wish to advise that we feel that the National Safe Transit Program is proving of considerable benefit to our company.

The benefits derived by our company are actually in several directions. First and foremost, we are sure when a package is approved by the testing procedure, that we have the best and cheapest package available. Our own plans are to continue to check each of our packaged appliances in an endeavor to get each approved under the program. In some cases our existing package passes with flying colors. However, it has been most interesting to find that there are some inherent weaknesses in our appliances which are showing up in these tests, and which we have failed to recognize through the usual medium of customer complaint. We anticipate producing a better product as a result of the use of this program.

Another item which makes the program economically sound is the fact that we have been able to review packaging, and have designed new packages at appreciable savings to our company. *Savings which have already been effected have more than paid for the testing expenses which have been accumulated.*

In other words you can see from these comments that we are sold on the idea of uniform testing of packages as is done by the National Safe Transit program. We know that the effort expended along these lines is definitely paying dividends to our company.

V. R. Mottinger
Chief Process Engineer
Day & Night Division
Affiliated Gas Equipment, Inc.
Monrovia, California

scientific method of attack on transportation problems

Dear Mr. Chase:

As a teacher of Materials Handling and Transportation, I am very much interested in the excellent work being done by the National Safe Transit Committee of whose Educational Division, you are the Chairman. I have just completed reading the excellent paper by Mr. R. F. Bisbee, Manager, Quality Control of Westinghouse at Mansfield, Ohio entitled "Methods of Evaluating Savings from Standardization."

Mr. Bisbee did a swell job and deserves a great deal of credit. In

THE R-S TWO-WAY RIDE RECORDER

Weight: 17½ pounds
Case Dimensions: 8" x 15" x 8"

An Important Unit in the "Safe Transit" Program Used in the Laboratory and in the Field

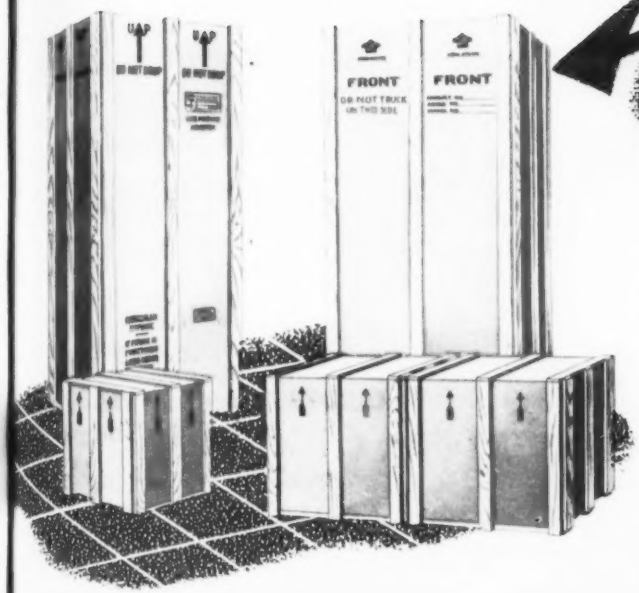
THE R-S Two-Way Ride Recorder meets all of the specifications adopted by the Porcelain Enamel Institute in their standard test procedure. Same sturdy design that has been used so successfully during the past twenty-eight years by both railroads and shippers. A simple and reliable instrument.

The amount of savings realized by many manufacturers who have used this recorder in accordance with the PEI testing procedure are enormous. One manufacturer has reduced losses from 28% to less than 1% because of the adoption of this "pre-transportation" testing. Another manufacturer making 80,000 units per year reports a saving of over $1 per unit because of saving in more effective, but cheaper and simpler, design of merchandise and crating.

Participate in the "Safe Transit" program as many others are doing. Write for more information on how YOU can save money and protect your products in transit.

"Now available with 16 day clock movement"

THE IMPACT REGISTER CO.
CHAMPAIGN, ILLINOIS



WATKINS
cleated, corrugated containers CUT SHIPPING COSTS

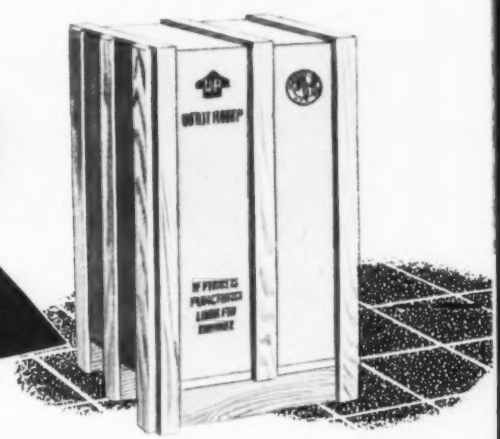
CONTAINERS made the Watkins way reduce shipping costs because they are scientifically designed to provide *complete* protection with lightest possible container weight.

Then, too, the fact that they are light in weight and arrive at your plant 75% assembled means that they are quickly and easily assembled to *completely* enclose your finished product, saving labor . . . saving time . . . saving expense.

To get *complete* protection: protection from outside dirt and dust . . . protection inside for fine product finishes—a smooth interior with no staples or rough surfaces.

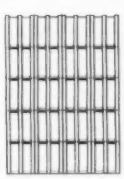
Then there is the extra "Travelling Billboard" feature providing for your advertising message in two colors on all sides. These are a few of the reasons why it is smart to ship the "Watkins Way."

Better Handling Convenience with WATKINS PALLET CONTAINER

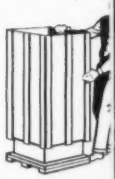


Here are some of the products that are being shipped in Watkins Containers:

Washing Machines	Space Heaters	Sinks
Ironers	Furnaces	Air Compressors
Hot Water Heaters	Pumps	Surgical & Hospital Equipment
Kitchen Ranges	Power Tools	Sanding Machines
Refrigerators	Fans	Furniture
Filing Cabinets	Soft Drink Coolers	Television
Clothes Dryers	Stokers	Radios
Dishwashers	Oil Burners	Water Softeners
Kitchen Cabinets	Garden Tractors	Vending Machines



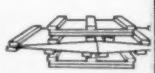
STACKING Vertical wood cleats provide EXCEPTIONAL SUPPORTING STRENGTH to carry heavy loads. Typical crate supports 4 tons.



QUICK Assembly line packing is speeded up. EASY TO HANDLE. *Complete* protection for your product.

STRONG All wood cleats securely glued to tube-mat. Laboratory tests prove glued cleats RESIST WEAVE AND DISTORTION BETTER.

STORING Containers are delivered flat (only 3 sections) and closely nested to CONSERVE STORAGE SPACE.



THERE IS A WATKINS CONTAINER MADE NEAR YOU

These companies build WATKINS containers

CORNELL PAPERBOARD PRODUCTS CO.	1514 E. Thomas Ave., Milwaukee, Wis.
COZIER CONTAINER CORP.	446 East 131st Street, Cleveland, Ohio
CRATE-RITE MFG. CORP., Division of Pacific Ports Ind. Inc.,	10901 Russet Street, Oakland, California
DURA-CRATES, INC.	940 East Michigan Street, Indianapolis, Indiana
GENERAL BOX CO.,	1825 Miner St., Des Plaines, Illinois, and 16th and Maple Sts., Louisville, Kentucky
HEMB & MARTIN MFG. CO.	Watseka, Illinois
ILLINOIS BOX & CRATE CO.	811 Center Street, Plainfield, Illinois
KIECKHEFER BOX & LUMBER CO.	1715 West Canal Street, Milwaukee, Wisconsin
LANE CONTAINER CORP.	10212 Denton Road, Dallas, Texas
LEWISBURG CONTAINER CO.	243 Singer Street, Lewisburg, Ohio
LOVE MFG., INC.	608 South Commerce Street, Wichita, Kansas

—an inquiry to any of these companies will get prompt attention—

The · WATKINS CONTAINER · Manufacturers

view of the deep interest which I have in all methods and means for *reducing waste* and *eliminating damage* in transit, I would appreciate it if you would place me on the mailing list of your Safe Transit Committee so that I could receive the latest progress reports of the Committee.

I believe that the scientific method of attack as practiced by your Safe Transit Committee will go a long way in solving one of transportation's costliest headaches and heartaches. More power to you and your excellent group.

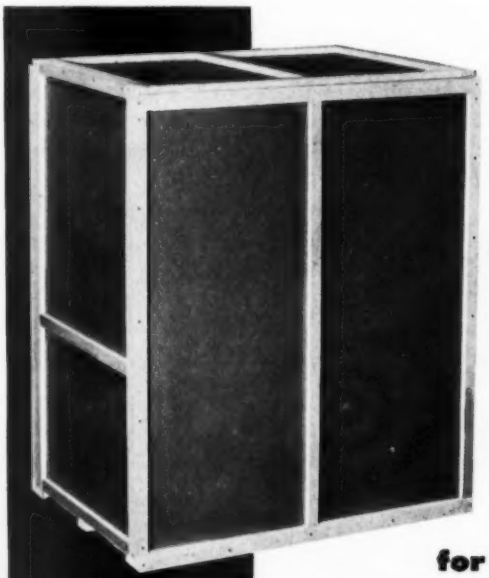
Samuel Rubin
Professor, Transportation
University of Southern California
Los Angeles, California

Important work

To Finish:

"We have been watching the progress on 'Safe Transit' with considerable interest, and think you are certainly to be congratulated on the excellent job you are doing in this important work."

Thur Schmidt
Director of Research & Development
Ingersoll Products Division
Borg-Warner Corporation
Chicago, Illinois



Cleated Fibre Shipping Containers

for Refrigerators, Ranges, Washers, Furnaces and other appliances

Major appliances are handled and shipped with greater safety when packaged in cleated fibre containers.

Cornell Cleated Fibre Containers are dirt-proof, light in weight, strong, and can be printed to dramatically display and advertise your product.

Cornell Cleated Fibre Containers fully meet government specifications JAN-P-103 and NN-B-591a.

FOR boxes ...IT'S

CORNELL
PAPERBOARD PRODUCTS CO.
MILWAUKEE 1, WISCONSIN

SPECIALTY PAPERBOARDS • FOLDING CARTONS
CORRUGATED BOXES • SOLID FIBRE BOXES
CLEATED FIBRE CASES • FIBRE WALL BOARDS

—New Product—

CUSHION-TYPE WRAPPING FOR LARGE PRODUCTS

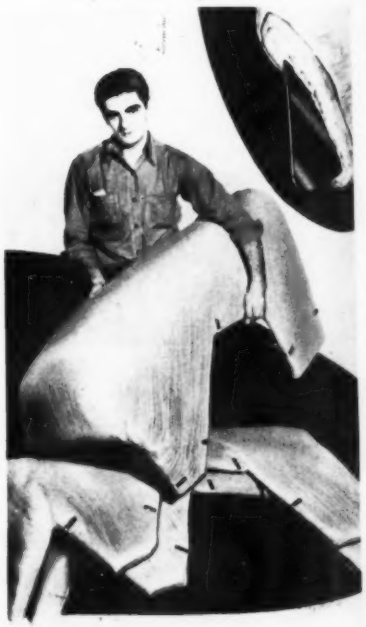
An improved cushion-type wrapping, for protecting large or oddly-formed parts or products from in-transit or storage damage, consists of sheets of heavy, tough, crepe paper between which are fastened cushioning layers of excelsior.

The integral wrapping is tailored to fit each product, and is held in place by special clips which permit easy nesting and handling of parts.

Although first designed as protective wrapping for automotive parts, the manufacturer states they are now preparing to engineer wrapping for other products.

Further information may be secured by writing to *finish*.

Showing how the new wrapping protects odd-shaped parts. Cut-away shows how the surface of a product is protected.



GENERAL BOX HONORS EMPLOYEES

General Box Company has presented watches to 115 pioneer and other employees with over 25 years of service with the company or its predecessors.

The presentations were made by Norris W. Embry, newly-elected chairman, and a pioneer employee. Oldest current employee, from the standpoint of service, is Paul E. Duzeski, secretary and general counsel, who joined a predecessor firm in 1906.

GENERAL BOX NAMES EMBRY CHAIRMAN, CRAGWALL PRES.

At the annual meeting of stockholders of General Box Company, on March 13, it was announced that N. W. Embry was elected chairman of the board, succeeding E. E. Ames, who will continue to serve as a director. Embry's plans call for a partial retirement from day to day management of the firm.

J. A. Cragwall

J. A. Cragwall, vice president and manager of the firm's Kansas City Division, was elected president.

At the same stockholders meeting, five directors were unanimously re-elected to three-year terms. They were J. A. Cragwall; D. B. Forrester, of Meridian, Mississippi; D. F. Hahn, of Wilmette, Illinois; S. F. Talbert, of Houston, Texas; and C. C. Watkins, of Evanston, Illinois.

M. W. Swenson, of Sheboygan, Wisconsin, was elected a director for a one-year term. Brooks Wynne was elected assistant secretary and attorney of the company.

STEEL KITCHEN CABINET ASSOCIATION JOINS INDUSTRY DIVISION OF SAFE TRANSIT COMMITTEE

At a meeting on Wednesday, March 5, at the Cleveland Hotel, Cleveland, Ohio, the Steel Kitchen Cabinet Manufacturers Association accepted the invitation of the National Safe Transit Committee to join with other cooperative associations in the work of this voluntary cooperative group to improve packaging and shipping practices and reduce in-transit losses.

The packaging transportation and traffic committee of SKCMA designated Gilbert May, traffic manager of American Kitchens Division, Avco Manufacturing Corporation, as the Association's representative on the NST Committee. Chairman of the Association's traffic committee is A. C. Deimel, of Mullins Manufacturing Corporation.

FROM YOUR PLANT . . .

TO YOUR CUSTOMER . . .

A. J. GERRARD STRAPPING & TOOLS

PROTECT YOUR PRODUCT
PREVENT DAMAGE CLAIMS
PARE DOWN COSTS

FIBER-and-STEEL Strap

Protects Fine Finishes
Its soft Kraft paper outer layer won't scuff or damage the finest enamel finish. Inner layer of steel strap defies shipping shocks.

BULKBINDER Strap and Tools
Brace and Protect in Car, Truck or Ship

The Stretcher pulls ¾" or 1¼" wide strap taut, and the Sealer applies the seal. The Cutter quickly and easily severs new strap from reel, or excess strap after tightening. It also removes and salvages strap from incoming crates.

THE LOW COST LINE! . . . You buy all A. J. Gerrard strapping tools outright. No leases, no rentals, no added expenses.

THE COMPLETE LINE! . . . BULKBINDER line for heavy duty strapping.
STEELBINDER line for general strapping.

Consult your classified phone directory for your A. J. Gerrard dealer or write

A. J. Gerrard & Co.

1958 Hawthorne Place • Melrose Park, Ill. (Chicago Suburb)

STEEL KITCHEN CABINET ASSOCIATION MEETS

In line with its policy adopted at its first annual meeting, the recently established Steel Kitchen Cabinet Manufacturers Association held its first quarterly meeting under the new plan, March 5, at the Cleveland Hotel, Cleveland, Ohio. The meeting was unusually well attended with representation of approximately 90% of the industry manufacturing capacity.

The Association board of directors and committees met in the morning, the afternoon and evening being given over to a general session.

Committee chairmen reported and work is under way by the committees. The report of Arthur J. Tuscany, executive secretary-treasurer, indicated the Association is progressing and is in a sound financial condition.

Association director Chas. A. Morrow, of Mullins Manufacturing Corporation, made an interesting presentation on "The Washington Picture". Davitt S. Bell, president, Edgewater Steel Company and its Tracy Manufacturing Division, reported on the Steel Kitchen Cabinet OPS Industry Advisory Committee, which met recently. John Kishler, business specialist, Chief of Office of Small Business, NPA., spoke on "The Outlook for Defense Work".

Following the social hour and dinner, Irwin Such, Editor of *Steel*, discussed "What's Ahead for Metal Working".

To fill a vacancy on the board of directors, C. K. Clarke, newly appointed general sales manager of American Kitchens Division of Avco Mfg. Corp., was elected a director, and Chas. S. Motter, of Morton Manufacturing Co., was elected vice president. These changes in the board personnel were occasioned by the recent resignation of F. F. Duggan, formerly with American Kitchens Division, who was recently appointed to enlarged responsibilities with the Crosley Division, also of Avco. Formerly, Duggan was a director and vice president of the kitchen cabinet group.

In commenting on the meeting, Association president M. M. Miller, president of Miller Metal Products, Inc., Baltimore, Md., stated: "The excellent enthusiasm of every Association member, the splendid attendance at this quarterly meeting, and the fine cooperation on the part of all committees was most inspiring. There seems little question that the new organization is on its way".

SHERWIN-WILLIAMS INDUSTRIAL DIVISION PROMOTION

Two headquarters promotions in the general industrial division of The Sherwin-Williams Co. were announced by G. L. Hehl, division general manager.

"The company's new position in the industrial finishing market," Hehl said, "requires specialized attention to increase our service to American industry. The new appointments are designed to stimulate this specialized program."

D. S. GAARDER

L. M. MUSE

D. S. Gaarder, formerly assistant general, was named manager of the new products department. In his new position,Gaarder will direct the development and marketing of major new products.

L. M. Muse, formerly assistant to the general manager, was named manager of the branches department. His new duties involve the training of, and sales support to, branch and regional personnel.

IRVINE TO DIRECT MAYTAG FACTORY ENGINEERING

W. A. Irvine, former works manager of Canadian General Electric, Montreal, has been named manager of production engineering on the staff of the vice president in charge of manufacturing, The Maytag Company, Newton, Iowa. This assignment places Irvine in charge of direction and coordination of all Maytag factory engineering.

MIDWEST ENAMELERS NAME THREE NEW COUNCIL MEMBERS

The Midwest Enamelers Club recently elected the following new Council members: John F. Ohlhauser, of Dwyer Products Corp., Michigan City, Indiana, A. H. Daumke, Chicago office, The Harshaw Chemical Company; and W. I. Plankenhorn, University of Illinois, Urbana.

DOW CORNING SHOWS WHAT SILICONES WILL DO

Small section of traveling display of silicone applications.

In earlier issues of *finish*, the editorial page (*Finish Line*) has referred to the effective use of industrial exhibits as a medium of education to tie in with effective advertising, sales promotion and selling of products used by industry.

Finish editors were recently invited to inspect an exhibit of Dow Corning Corporation, Midland, Michigan, in whch the practical applications for silicones are effectively presented.

Silicones are versatile

It took 24,000 pounds of demonstration units, parts and assemblies to do the job, but silicones were made to come alive to business executives, engineers, and to the man on the street. The exhibit gives many answers to that common question, "What's a silicone?" You find that silicones are fluids and resins that keep clothes and shoes and brick walls dry in the rain. They're compounds that keep radar from going blind on a foggy night. They're fluids that polish without rubbing.

They're rubber that won't melt on hot aircraft engine cylinders or freeze on switches that operate bomb bay doors at 100 degrees below zero. They're electrical insulating resins that multiply by ten the life of electric motors and apparatus.

Silicones are mold lubricants that eliminate 90% of the scrap in the rubber industry; save 80% of the cost of cleaning molds. *They're paints that protect metal at 1000° F.* They're work savers and life preservers, conservers of copper, protectors of metals, foam killers.

Applications in the appliance field

Some of the applications that are outlined for the appliance field are the following:

Finishes and protective coatings for room heaters and other home appliances; heat-resistant coatings for heat exchangers; pan glaze finish for bread baking pans (also for coating the interior of waffle irons to prevent sticking); silicone rubber for hand irons; silicone insulators and lubricants for toasters; resin-bonded heater wire supports; motor windings and parts for automatic and spinner-type washers; lubricants for sealed motors (industrial fans call for silicone-insulated motors and silicone-lubricated motors).

At this early stage, this list seems to indicate that silicones may play an important part in the production of tomorrow's home appliances.

CANADIAN CERAMIC SOCIETY HOLDS 50TH MEETING

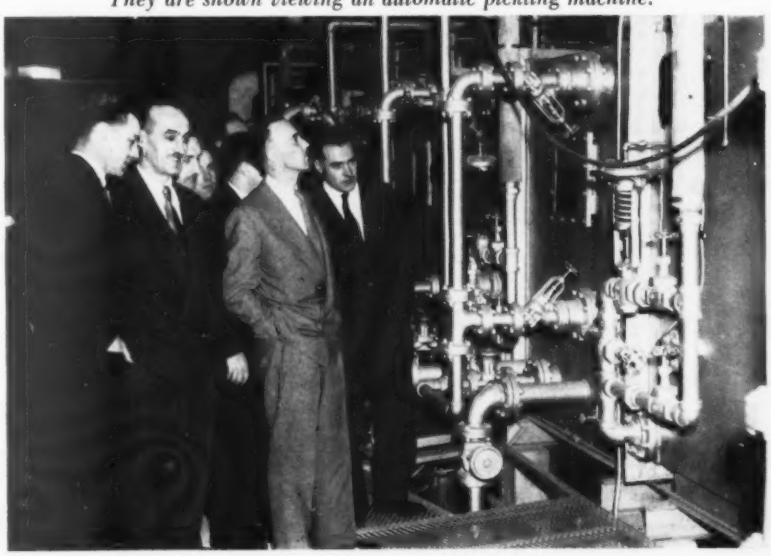
The Canadian Ceramic Society held its 50th annual meeting, February 11-13, in Niagara Falls, Ontario.

Officers elected include: president, H. C. Bates, Corning Glass Works of Canada Ltd.; vice president, Ryland J. New, National Sewer Pipe Co.; secretary, Howells Frechette; assistant secretary, L. C. Keith.

Enamel Division officers include: chairman, M. Reagan, Stamped & Enamelled Ware Ltd.; secretary, Robert Shand, Ferro Enamels Canada Ltd.; directors, J. Crawley, Enamel & Heating Products, Ralph Kimpton, The O. Hommel Co., and F. A. Bidwell, Canadian Westinghouse Co.

Enamel Division speakers included: E. E. Marbaker, Mellon Institute; B. Sweo, Ferro; C. P. Lohman, Pemco; and Robert Holt, Ferro Enamels.

Society members visited General Steel Wares plant in London, Ontario. They are shown viewing an automatic pickling machine.



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ADMIRAL V. P. RETIRES

Richard F. Dooley, vice president of Admiral Corporation, retired February 15 after serving the company since its founding in 1934, Ross D. Siragusa, president and board chairman, has announced. Dooley will continue as a director and will be called on for counsel as the need arises.

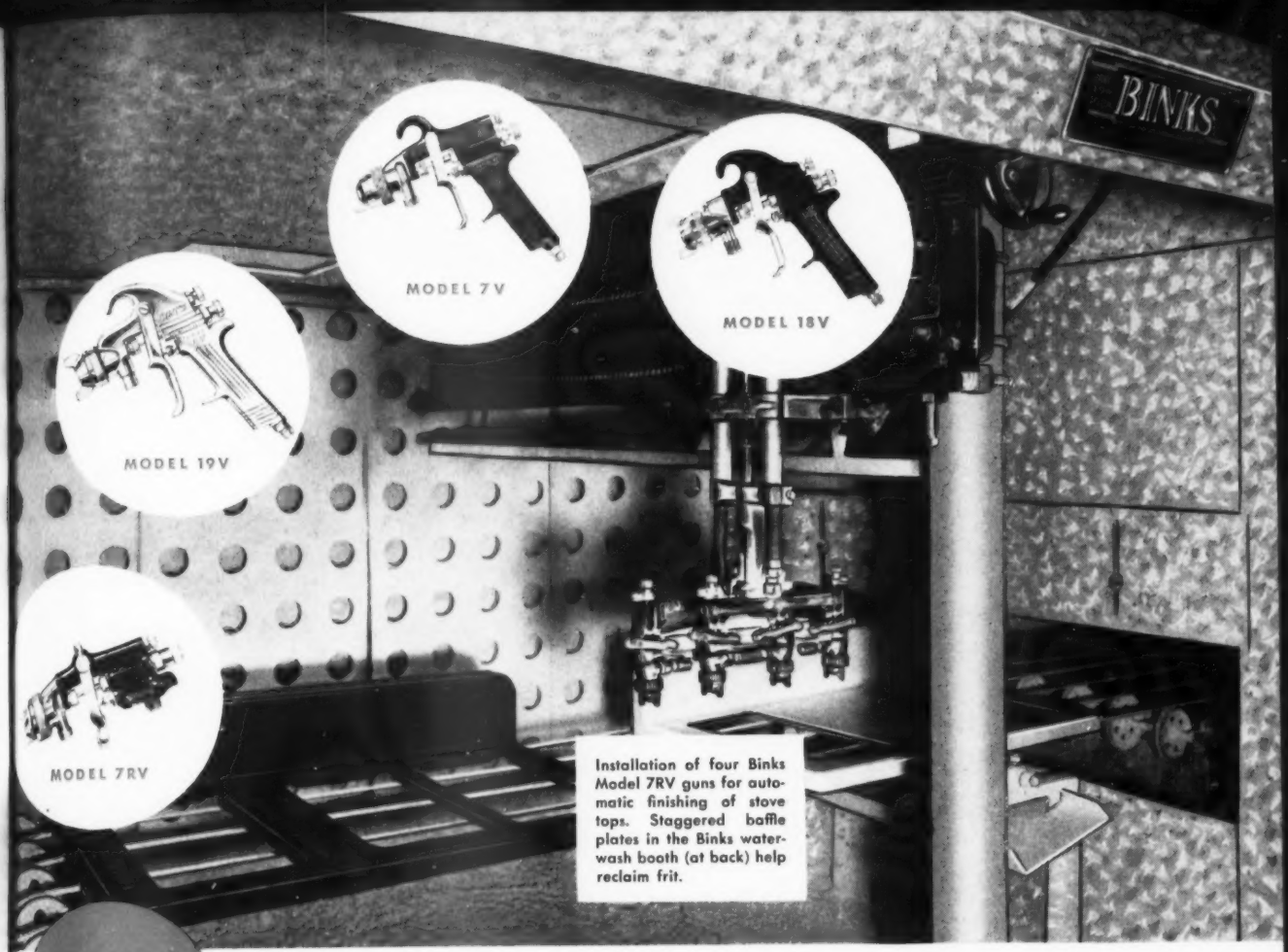
The retiring executive has been with Admiral since its organization with a capital of $3400 in the depth of the depression. His association with Siragusa dates back to World War I years when they were classmates in grammar school in Chicago.

BITUMINOUS COAL RESEARCH GROUP MEETS IN CHICAGO

Executives of the coal, railroad, and allied industries suporting the program of Bituminous Coal Research, Inc., met February 28, in Chicago, to discuss coal research progress and to chart a course for future research and development leading to increased coal markets.

Progress was reported on projects leading to the development of a coal-fired gas turbine for locomotive use, new continuous mining machines, and improved equipment for coal utilization. Exhibits supplemented the progress reports in showing research advancements in residential heating equipment, coal-fired gas turbines, stainless steel belts for conveying coal, smoke abatement devices, and non-fuel uses of coal.

New BCR officers elected include: A. A. Potter, president; H. J. Rose, vice president and director of research; R. H. Sherwood, first vice president; R. E. Salvati, vice president; C. A. Reed, secretary; M. L. Garvey, treasurer; and J. F. Hanley, assistant secretary-treasurer.



Installation of four Binks Model 7RV guns for automatic finishing of stove tops. Staggered baffle plates in the Binks water-wash booth (at back) help reclaim frit.

SPRAY GUNS for every ceramic finishing need!

Maybe your job involves manual or automatic application of vitreous enamel on metal . . . or decorating glassware with colors . . . or glazing of clay products like pottery, tile and sewer pipe. Whatever your need, if the material is sprayable, Binks has a gun for it. And a Binks ceramic spray gun lasts *longer* because it has tungsten carbide inserts to reduce wear at the important point where the material leaves the gun.

HERE ARE THE FOUR LEADERS FOR CERAMIC FINISHING APPLICATIONS:

Model 18V (V designates tungsten carbide inserts)—Finest gun in the line. A precision model for applying fine finishes at low cost at production-line speeds.

Model 7V—A heavy-duty production gun. This is a long time favorite.

Model 19V—A remarkable light-weight production spray gun, using the same nozzles as Model 18.

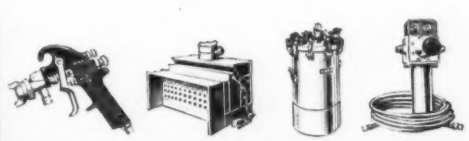
Model 7RV—A heavy-duty gun for automatic ceramic finishing of such flat surfaces as table tops, range parts, etc. Other automatic guns are available for ceramic finishing of round, hollow or many sided objects.

A FREE service to Ceramic Finishers

Roy Beck, a nationally known ceramic engineer, heads a special Ceramic Department at Binks. His expert knowledge of ceramics and long ceramic experience is available—without obligation—to anyone who has a ceramic finishing problem. Write Binks Manufacturing Company, 3122-40 Carroll Ave., Chicago 12, Ill.

Binks

EVERYTHING FOR CERAMIC FINISHING



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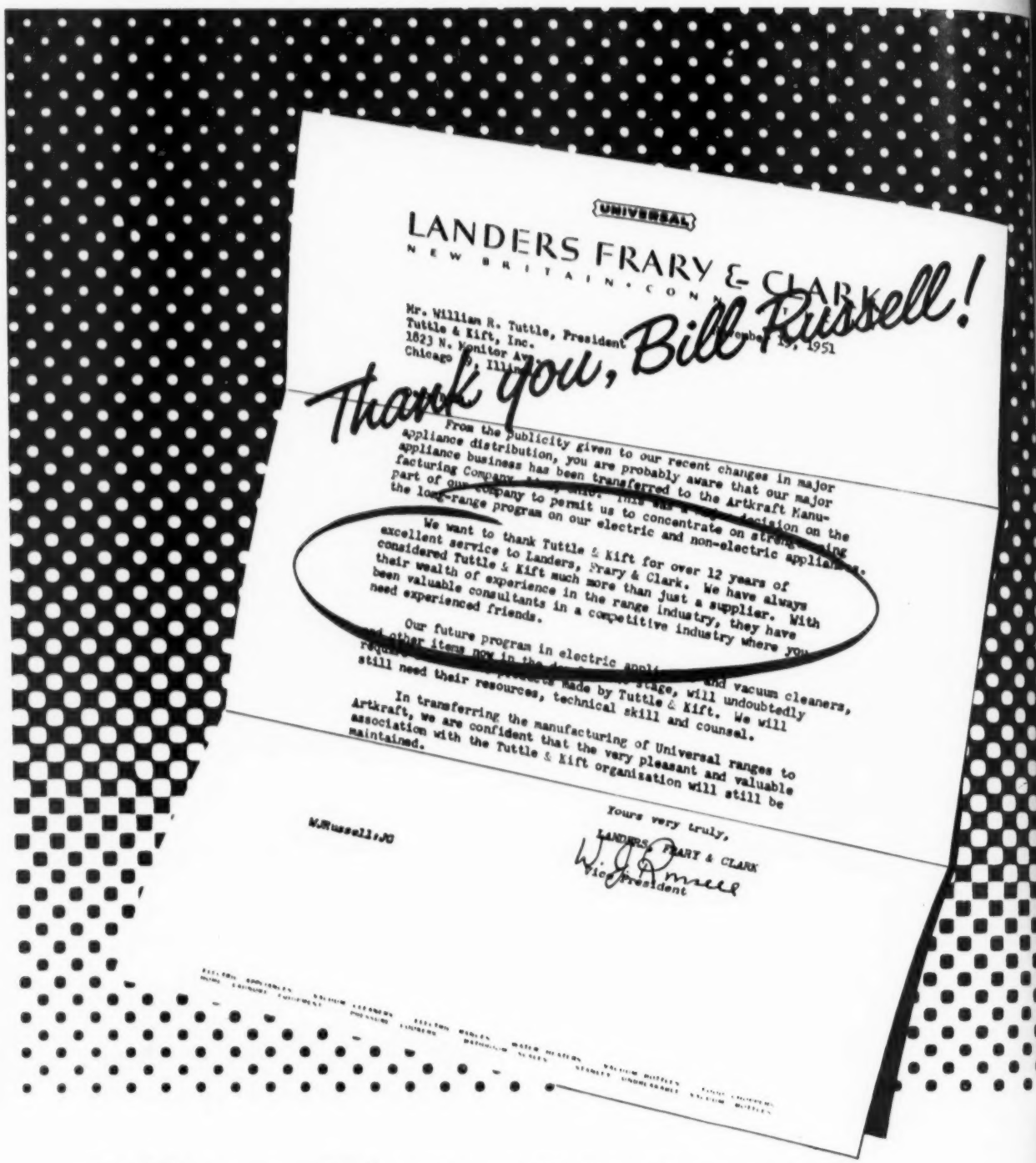
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Thank you, Bill Russell!
Mr. William R. Tuttle, President
Tuttle & Kift, Inc.
1823 N. Monitor Ave.
Chicago 39, Illinois
From the publicity given to our recent changes in major appliance distribution, you are probably aware that our major appliance business has been transferred to the Artkraft Manufacturing Company
We want to thank Tuttle & Kift for over 12 years of excellent service to Landers, Frary & Clark. We have always considered Tuttle & Kift much more than just a supplier. With their wealth of experience in the range industry, they have been valuable consultants in a competitive industry where you need experienced friends.
Our future program in electric appli
and vacuum cleaners,
stage, will undoubtedly
made by Tuttle & Kift. We will still need their resources, technical skill and counsel.
In transferring the manufacturing of Universal ranges to Artkraft, we are confident that the very pleasant and valuable association with the Tuttle & Kift organisation will still be maintained.
Yours very truly,
LANDERS, FRARY & CLARK
Vice President
WJRussell:JG

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